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USATHAMA

U.S. Army Toxic and Hazardous Materials Agency

VOLUME II

JEFFERSON PROVING GROUND

RI/FS SAMPLING DESIGN PLAN

Prepared For:

**U. S. ARMY TOXIC AND
HAZARDOUS MATERIALS AGENCY (USATHAMA)
ABERDEEN PROVING GROUND, MARYLAND**

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1.0 INTRODUCTION

The purpose of this Sampling Design Plan is to provide a plan for the field sampling and laboratory analysis to be performed in support of Remedial Action/Feasibility Studies (RI/FS) at Jefferson Proving Ground (JPG), Madison, Indiana. Included in this plan are activities designed to fulfill the requirements of a Screening Site Inspection (SSI). This plan is intended to be a guide that incorporates specific rationale and objectives for each sampling and analysis activity, sampling protocols and procedures, data and document management, and data interpretation and evaluation. Also included are logistics and schedule for the proposed RI field activities.

The sections that follow describe in detail the field investigation activities for sites identified at JPG which are known or suspected to have released hazardous contaminants to the environment and that may pose a threat to human health or the environment. As described in the Technical Plan (Volume I), several of the sites at JPG require additional information on the type(s) and extent of contaminants. This plan addresses the sampling design and procedures to be used to meet the objectives identified in the Technical Plan. Figures are included which show the proposed sampling locations, and corresponding tables are included to identify the sample number, type, and required analyses. Sections describing general equipment decontamination, sample handling, data and document management, logistics, and schedule are project-wide activities and follow the discussions of individual site field activities.

Results of the field investigation activities outlined in this document will be used in the evaluation of:

- The presence or absence and relative concentrations of reported or suspected contaminants at identified waste sites;
- The vertical and lateral extent of contamination; and
- The potential pathways for the migration of contaminants within the environment.

On the basis of these results, an assessment of risk to public health and the environment can be made and evaluation of remedial action alternatives can be completed.

2.0 SITE BACKGROUND

This section provides an abbreviated summary of the background information presented in the Technical Plan (Volume I) which describes the location, geologic and hydrologic setting, installation history, and previous investigations.

2.1 Location

JPG occupies 55,265 acres of land along U.S. Highway 421 north of Madison, Indiana (Figure 1). The facility is located in portions of three counties (Ripley, Jennings, and Jefferson Counties). The installation is approximately 18 miles long (north-south) and 5 miles wide (east-west). Figure 2 shows the location of buildings, roads, and sites to be characterized south of the firing line at JPG.

2.2 Geologic and Hydrologic Setting

Jefferson Proving Ground lies on the western limb a plunging anticline known as the Cincinnati Arch. It also lies within the Till Plains Section of the Central Lowlands Province. In general, the geology at JPG is characterized by glacial till overlying Ordovician and Silurian bedrock consisting of limestones and dolomites interbedded with shales.

Unconsolidated materials consist of loess over glacial till which are typically 25 to 35 ft. thick (range from 0-50 ft.). These deposits are generally not present in and near stream valleys. Soils at JPG have been derived from the glacial parent materials. These soils are strongly weathered, leached, and acidic. The majority of the soils at JPG are clay and silt loams with low permeability.

The soils and glacial till deposits are underlain by Ordovician, Silurian and Devonian carbonate units. These include the Muscatatuck Group (Devonian); Louisville Limestone, Salamonie Dolomite, and Brassfield Limestone (Silurian); and Maquoketa Group, Trenton and Black River Limestones, and Knox Dolomite (Ordovician).

Groundwater at JPG is primarily stored in Silurian and Devonian limestone aquifers. The Brassfield Limestone is the principal aquifer underlying JPG. The limestone aquifers are confined by the overlying fine-grained glacial materials. Wells in the area of JPG range in depth from 50 to 250 ft. and yields range from 10 to 100 gallons per minute (USGS, 1985). Groundwater from the limestone aquifers is generally hard with potentially high sulfur contents.

Little information exists for groundwater flow within the JPG facility. Previous monitoring wells were installed for sampling for contaminants and little aquifer characteristic data have been obtained. However, it is anticipated that groundwater flow rates through the limestone aquifers are generally low to moderate.

Six major streams cross JPG in a northeast to southwest direction. These Otter Creek, Graham Creek, Little Graham Creek, Big Creek, Middle Fork Creek, and Harberts Creek. Surface water bodies in addition to the 6 creeks include 2 lakes, Old Timbers Lake and Krueger Lake which have been previously stock with a variety of fish. Also present are several ponds and impoundments.

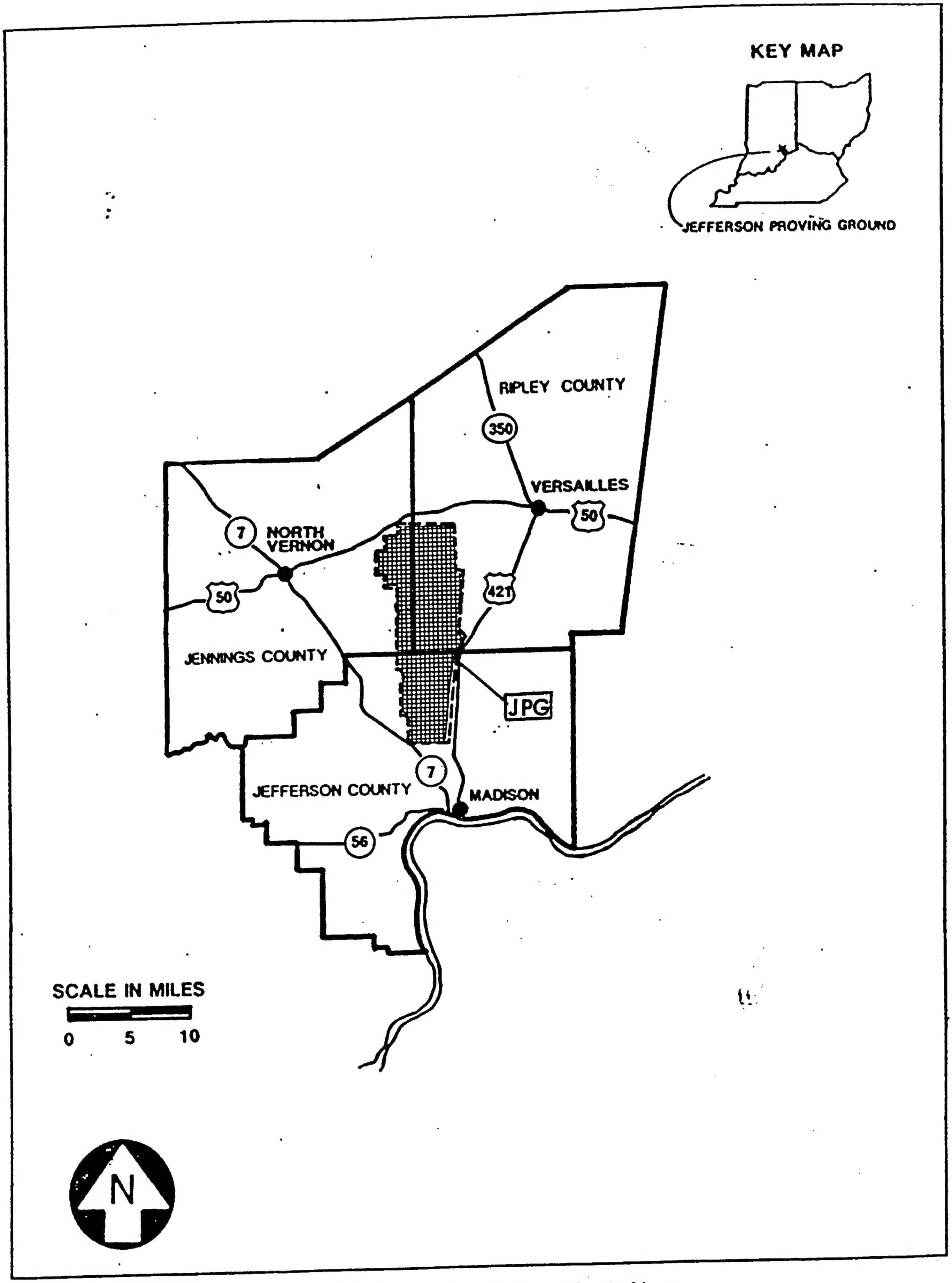


Figure 1. Location Map of Jefferson Proving Ground, Indiana.

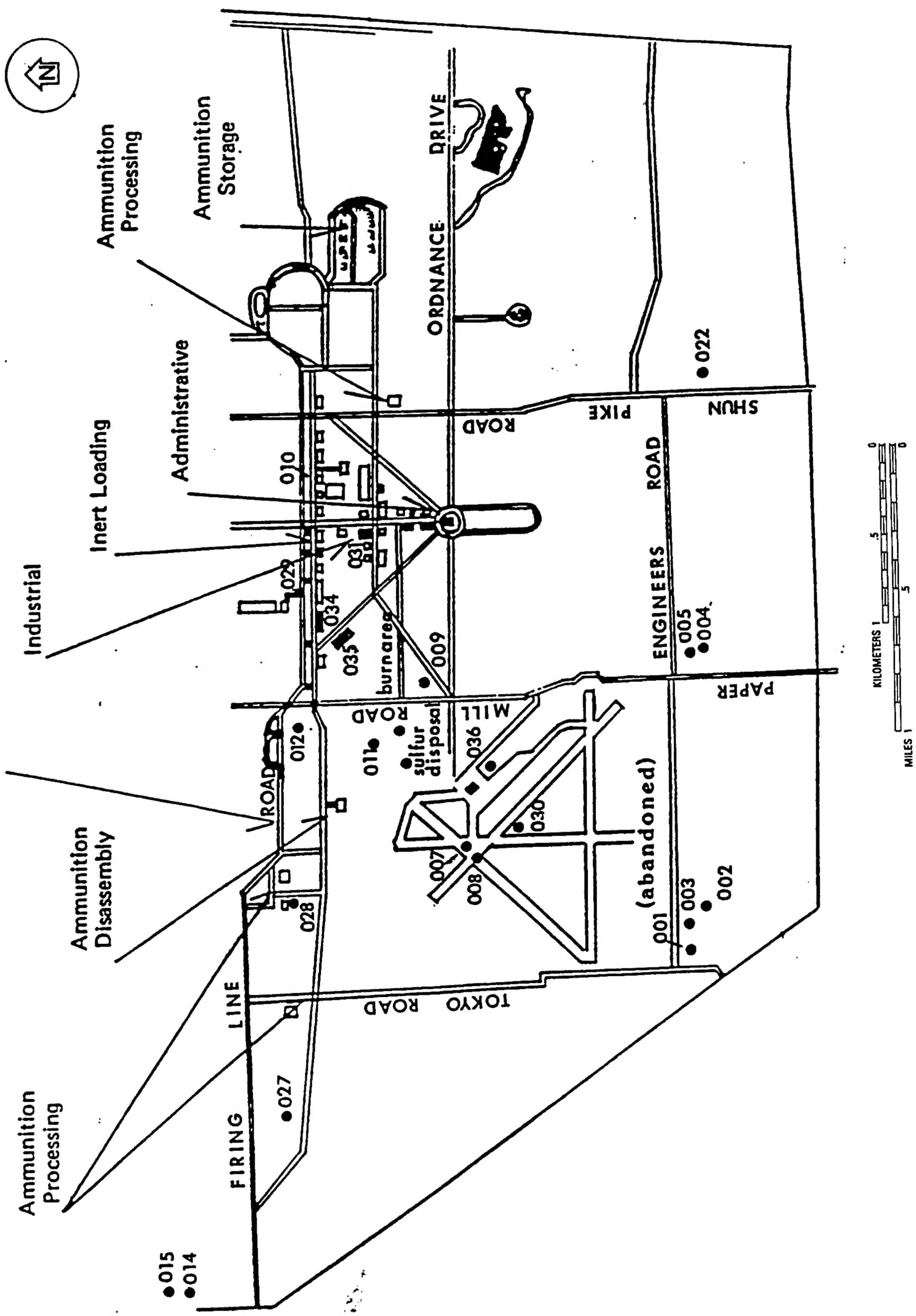


Figure 2. Location Map of RI/FS Sites South of the Firing Line, Jefferson Proving Ground, Indiana

2.3 Installation History

JPG was established in 1941 as a Class II military installation assigned to the Ordnance Department, Army Services Forces, with the mission of production acceptance and specification testing of all types of ordnance. These included propellants, projectiles, cartridges, mortars, grenades, fuses, primers, boosters, rockets, tank ammunition, mines, and weapon components. Peak production periods at JPG corresponded to times of national conflict such as World War II, the Korean War, and the Vietnam War. Since the 1970s, JPG has experienced a steady decline in production and, in 1988, the installation was identified by the Defense Secretary's Commission on Base Closure and Realignment for closure.

The installation consists of industrial buildings, workshops, and test facilities as well as administrative buildings and personnel housing in the area south of the firing line. This line consists of a line of 268 gun positions which run east-west across the southern portion of JPG. Areas north of the line consist mainly of impact areas with safety fans.

2.4 Previous Investigations

References to previous investigations are found in Section 8.0 of this plan. Several investigations were conducted at JPG covering a variety of environmental concerns. These reports included the following:

- Environmental Impact Assessment (O'Neill, 1978)
- Installation Assessment (USATHAMA, 1980)
- Update of Initial Assessment (Environmental Science and Engineering, 1988)
- RCRA Part B Permit for Open Burning/Open Detonation (U.S. Army Corps of Engineers, 1988)
- Draft RI Technical Report (Environmental Science and Engineering, 1989)
- Enhanced Preliminary Assessment (Ebasco, 1990a)
- Master Environmental Plan (Ebasco, 1990b)
- Environmental Audit (USEPA, 1990)

Although the above investigations have resulted in the identification of numerous potentially hazardous waste sites, little work has been performed to characterize the nature and extent of contamination at JPG. Additional studies will be required to allow JPG to satisfy federal, state, and local environmental laws and regulations and to provide USATHAMA with sufficient data to make informed decisions on remedial action alternatives required to complete the base closure process.

3.0 Sampling Objectives

This section restates the objectives of the proposed site-specific RI field and analytical work task presented in the Technical Plan (Volume I). The overall objective of the RI/FS process at JPG is to ensure that there is no significant risk to human health or the environment and to ensure compliance with applicable federal and state laws and regulations. To this end, certain data gaps have been identified which must be filled prior to making decisions on future remedial action and base closure activities. The scope of this plan, with the exception of the Gate 19 Landfill Area (sites 14 and 15), is restricted to those areas of JPG that are located south of the firing line. The following are summaries of the objectives previously identified in the Technical Plan (Volume I) for those sites where data gaps exist:

3.1 Building 185 Incinerator

- Confirm the presence or absence of metals contamination in soils surrounding the abandoned incinerator.

3.2 Building 177 Sewage Treatment Plant

- Confirm the presence or absence of potentially hazardous contaminants in Harbert Creek that may be related to sewage treatment plant or water quality laboratory discharge.
- Determine if soils where on-site storage or disposal of sludge has occurred are contaminated with heavy metals or cyanide.

3.3 Explosive Burning Area

- Confirm the presence or absence of potentially hazardous contaminants in soil as a result of previous burning activities on the ground surface.

3.4 Abandoned Landfill

- Identify the locations of previous buried trenches.
- Evaluate whether a release of contaminants to the environment has occurred as a result of previous landfill burial of potentially hazardous materials.
- Determine if groundwater contamination has occurred if soils are found to be contaminated at depth.

3.5 Wood Storage Piles

- Confirm the presence or absence of PCP, heavy metals and dioxin in soils from the storage and burning on PCP-containing woods.

3.6 Red Lead Disposal Area

- Determine the exact location of the former Red Lead Disposal Area.
- Once the location is defined, confirm the presence or absence of lead and barium in the soils at the former disposal site.
- Provide initial site characterization data on the vertical and horizontal extent of contaminants.
- Determine if groundwater contamination has occurred if contamination in soils is present at depth.

3.7 Small Arms Firing Range

- Identify contaminants present within the building and their relative concentrations.
- Confirm the presence or absence of metals contamination outside of the building in surface soils.
- On the basis of contaminants found, assess the potential risk to human health and need for further studies.

3.8 Burning Ground (South of Gate 19 Landfill)

- Define the location of previous trenches.
- Determine if releases of contaminants have occurred in surface and subsurface soils.
- Determine if releases of contaminants have occurred in the surface water pathway near the burning ground.
- Provide initial site characterization data on the vertical and horizontal extent of contamination if present.

3.9 Gate 19 Landfill

- Evaluate previous groundwater sampling and analysis results to determine the need for additional groundwater monitoring.
- Identify specific areas within the landfill where metal containers or other metal debris have been disposed of that may be potential sources of contamination.
- Identify specific areas within the landfill where spent solvents were disposed of.
- Provide initial data on the vertical and horizontal extent of contamination associated with identified disposal sites within the landfill.

3.10 Burning Area for Explosive Residue

- Sample areas of surface staining to determine if potentially hazardous contaminants have been released to the soils at the site.
- If contaminants are found to exist at depth, obtain groundwater sample data to determine if contaminants have entered the groundwater pathway.

3.11 Building Solvent Pits (Buildings 602, 617, and 279)

- Further define the extent of VOC contamination in soils surrounding Building 279.
- Confirm the presence or absence of VOC contamination in soils at Buildings 602 and 617.
- Provide initial groundwater quality data at the Building 602 and 617 sites.

3.12 Old Fire Training Pit

- Determine the presence or absence of contamination in soils.
- Provide initial data on the vertical and horizontal extent of contamination if present.
- Determine if contaminants have been released to the groundwater pathway.

3.13 Yellow Sulfur Disposal Area

- Confirm the presence or absence of contamination in the surface water pathway
- Identify contaminants in soils associated with the sulfur disposal.
- Determine if contaminants have migrated to the groundwater pathway.

3.14 Burn Area South of New Incinerator

- Confirm the presence or absence of contaminants in surface soils.

3.15 Potential Ammo Dump Site

- Determine the location of the dump site.
- Evaluate the contents of the dump site by test pits.

3.16 Asbestos Containing Materials

- Conduct inventory and identify all potential asbestos-containing materials.
- Perform laboratory analysis, as required, to confirm asbestos materials.
- Prepare a report with recommendations for asbestos abatement.

3.17 Underground Storage Tanks

- Perform follow-on sampling to determine extent of contamination for former USTs.

3.18 Off-site Water Supply Wells

- Perform site inspection to determine if contaminants have been released to environmental pathways.

4.0 PROPOSED FIELD INVESTIGATION WORK TASKS

This section describes the proposed field investigation activities to be performed in support of the RI/FS as JPG. Location maps are provided which show the general location of proposed samples or field measurements. Detailed step-by-step procedures to be used during the field activities are presented in Appendix A. Table 1 provides a summary of the proposed field activities.

4.1 Building 185 Incinerator

4.1.1 *Surface Soil Sampling*

The Building 185 incinerator (Figure 3) consists of a Morse-Bouler, single chamber, single burner, single stack incinerator without an afterburner unit. The incinerator was used from approximately 1941 to 1978 to burn debris, small ammunition, and paper products from the installation.

No previous data exist for the Building 185 incinerator. Although a lack of evidence for significant risk to human health or the environment exits, 2 near-surface soil samples (0-1 ft.) will be taken to determine if metal contaminants are present in soils surrounding the abandoned incinerator. These samples will be analyzed for TCLP metals.

4.2 Building 177 Sewage Treatment Plant

4.2.1 *Sediment Sampling*

Contaminants may have entered Harberts Creek from discharge of industrial waste through the wastewater treatment plant outfall. The following sediment sampling activities are required to determine if these releases have occurred. Figure 4 shows the proposed sampling locations for sediment samples in Harberts Creek. Three downstream samples will be collected with the first sample being located 50 ft. downstream of the sewage treatment plant outfall. The remaining downstream locations are spaced every 50 ft. downstream of the first location.

Two upstream samples will be collected with the first sample being located 50 ft. upstream of the sewage treatment plant outfall. The second sample will be collected 50 ft. upstream of the first sample.

The sediment samples will be grab samples collected with a stainless steel scoop at a depth of 0-6 inches. For samples to be analyzed for TCLP metals and cyanide, the material will be collected near the mid-point of the drainage channel. Samples for TPH analysis will be collected from the portion of the bank representing the average water level.

Table 1
Summary of Proposed RI/FS Field Activities

SITE	Geophysical Survey	UXO Survey	Soil Gas Survey	Surface Soil	Subsurface Soil	Stream Sediment	Surface Water	Ground Water	Wipe Samples	ANALYTES
Bldg 185 Incinerator	—	—	—	2	—	—	—	—	—	TCLP Metals
Bldg 177 Sewage Treatment Plant	—	—	—	2	—	5	—	—	—	TCLP Metals, Cyanide, TPH
Explosive Burning Area	—	—	—	16	—	—	—	—	—	Explosives, TCLP Metals
Abandoned Landfill	2	1	—	—	12	—	—	3*	—	VOCs, semi-VOCs, TCLP Metals and Explosives
Wood Storage Piles	—	—	—	4	—	—	—	—	—	VOCs, Semi-VOCs, PCP, and dioxin
Red Lead Disposal Area	—	—	—	—	20	—	—	—	—	TCLP Metals
Small Arms Firing Range	—	—	—	4	—	—	—	—	40	TCLP Metals
Burning Ground	2	1	—	16	24	2	2	—	—	VOCs, semi-VOCs, TCLP Metals and Explosives
Gate 19 Landfill	2	—	40	10	20	—	—	—	—	BTEX (soil gas), VOCs, semi-VOCs, TCLP Metals
Burning Area for Explosive Residue	—	—	—	14	8	—	—	—	—	DNT, TNT, TCLP Metals, Herbicides
Bldgs 602, 617, and 279 Solvent Pits	—	—	—	—	36	—	—	8*	4	VOCs
Old Fire Training Pit	—	—	—	5	15	—	—	1*	—	VOCs, semi-VOCs, TCLP Metals
Yellow Sulfur Disposal Area	—	—	—	—	12	4	4	3*	—	Sulfur, TCLP, Metals, pH
Burn Area South of New Incinerator	—	—	—	4	—	—	—	—	—	explosives, metals, VOCs, semi-VOCs
Potential Ammo Dump Site	2	1	—	—	—	—	—	—	—	No samples
Underground Storage Tanks	—	—	—	—	48	—	—	—	—	TPH, BTEX
Off-Site Water Supply Wells	—	—	—	—	6	—	—	—	2	TPH, BTEX

*To be collected only if contaminants are present in Subsurface Soils

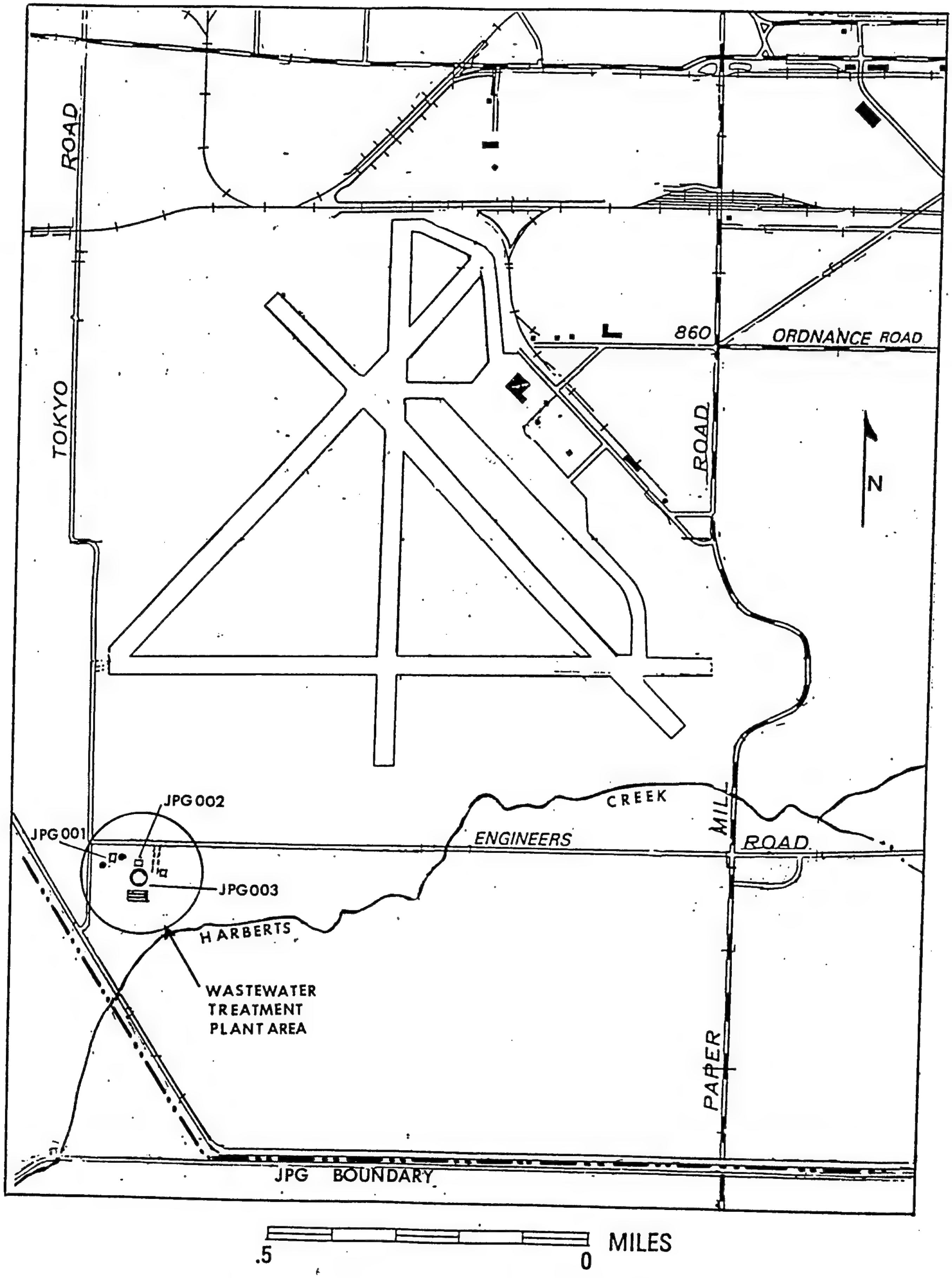


Figure 3. Sample Location Map of Building 185 Incinerator (JPG-001)

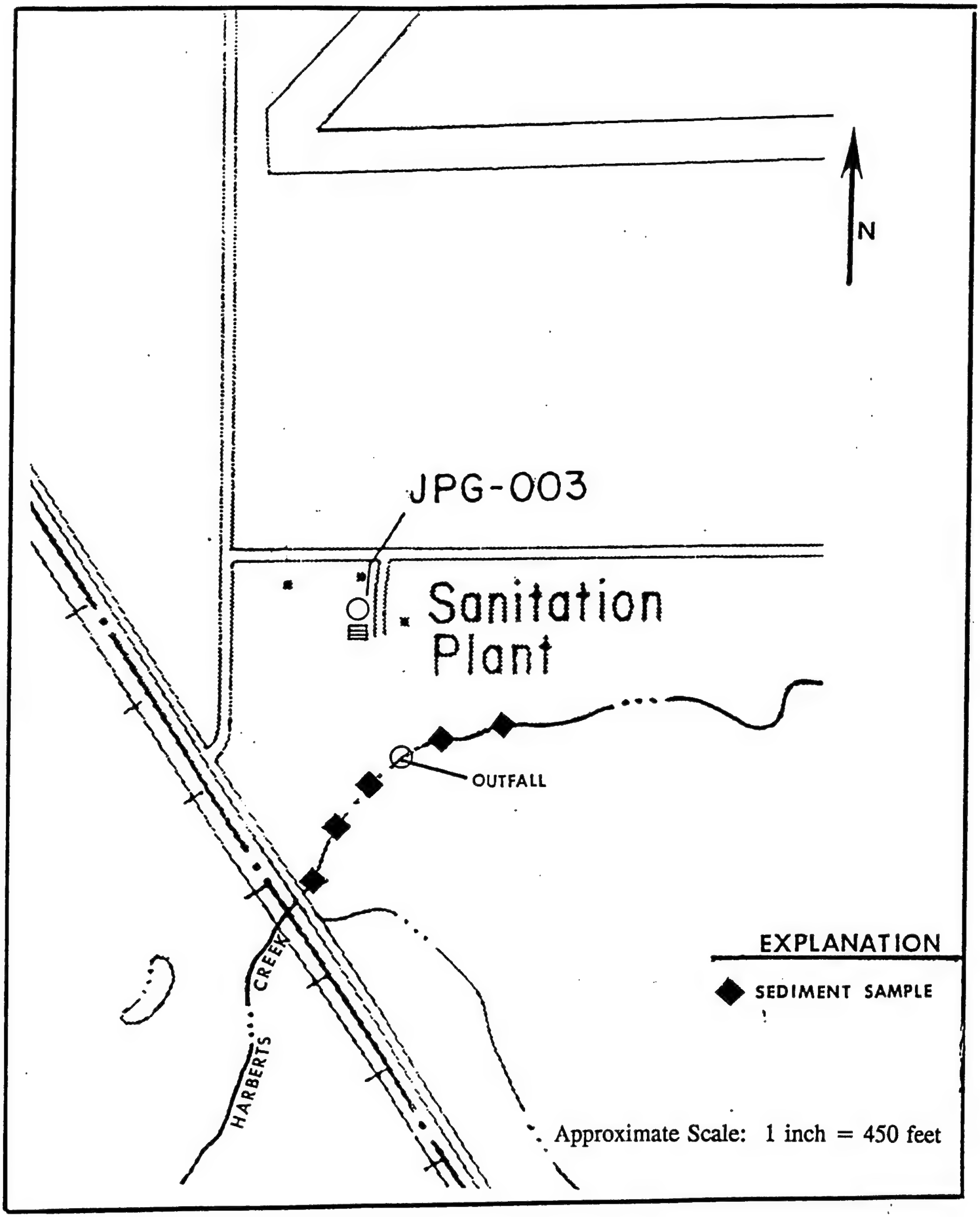


Figure 4. Building 177 Sewage Treatment Plant Sampling Locations

4.2.2 *Soil Sampling*

An area where on-site storage of sewage sludge occurred will be located on the basis of previous information and will be sampled to determine if contaminants from the sludge were leached into the surrounding soils. Two surface soil samples will be collected from a depth of 0-1 ft. using a stainless steel hand operated barrel auger. These samples will be analyzed for TCLP metals and cyanide. If these samples are found to contain contaminants exceeding background concentrations, additional sampling and location of other areas of storage and disposal may be required.

4.3 Explosive Burning Ground

4.3.1 *Surface Soil Sampling*

A grid covering an area of approximately 100 by 100 ft. will be established across the mid portion of the 2-acre site (Figure 5). Near the center of each grid, a near-surface soil sample will be collected at a depth of 0-2 ft. using a stainless steel hand operated barrel auger. The sample material will be a composite of the 2-ft. interval. This will result in the collection of 16 soil samples which will be analyzed for explosives and TCLP metals. The corner points of the sample grid will be surveyed to a known coordinate system and sample locations will be determined by measurements from the established corner points using a tape measure and line-of-site with the corner points and other grid locations.

4.4 Abandoned Landfill

4.4.1 *Geophysical Surveys*

Magnetometry and GPR will be used to determine the location of buried trenches at the abandoned landfill. The surveys will be conducted across the landfill area on a 20 ft. grid spacing (Figure 5). Results will be plotted on a grid map with anomalies identified and marked. For areas where anomalies occur, a closer-spaced survey may be conducted (i.e., 10 ft. spacing), if deemed necessary to clearly define the trench locations.

4.4.2 *Soil Borings and Sampling*

Once the trench boundaries have been defined, soil borings will be drilled using a hollow-stem auger rig. A stainless steel split-barrel sampler will be used to obtain soil cores at depths of 4-5 ft., 9-10 ft., and 14-15 ft. intervals. The hollow-stem auger with a retrievable center bit in place will be used to drill to the top of the desired sampling depth. The center bit will then be removed and a split-barrel sampler will be driven for the length of the desired sample interval and will then be removed for sample collection. Samples will be analyzed for VOCs, semi-VOCs, TCLP metals, and explosives. Samples (1 in 20) will also be collected for physical testing per USATHAMA Geotechnical Requirements (Appendix B).

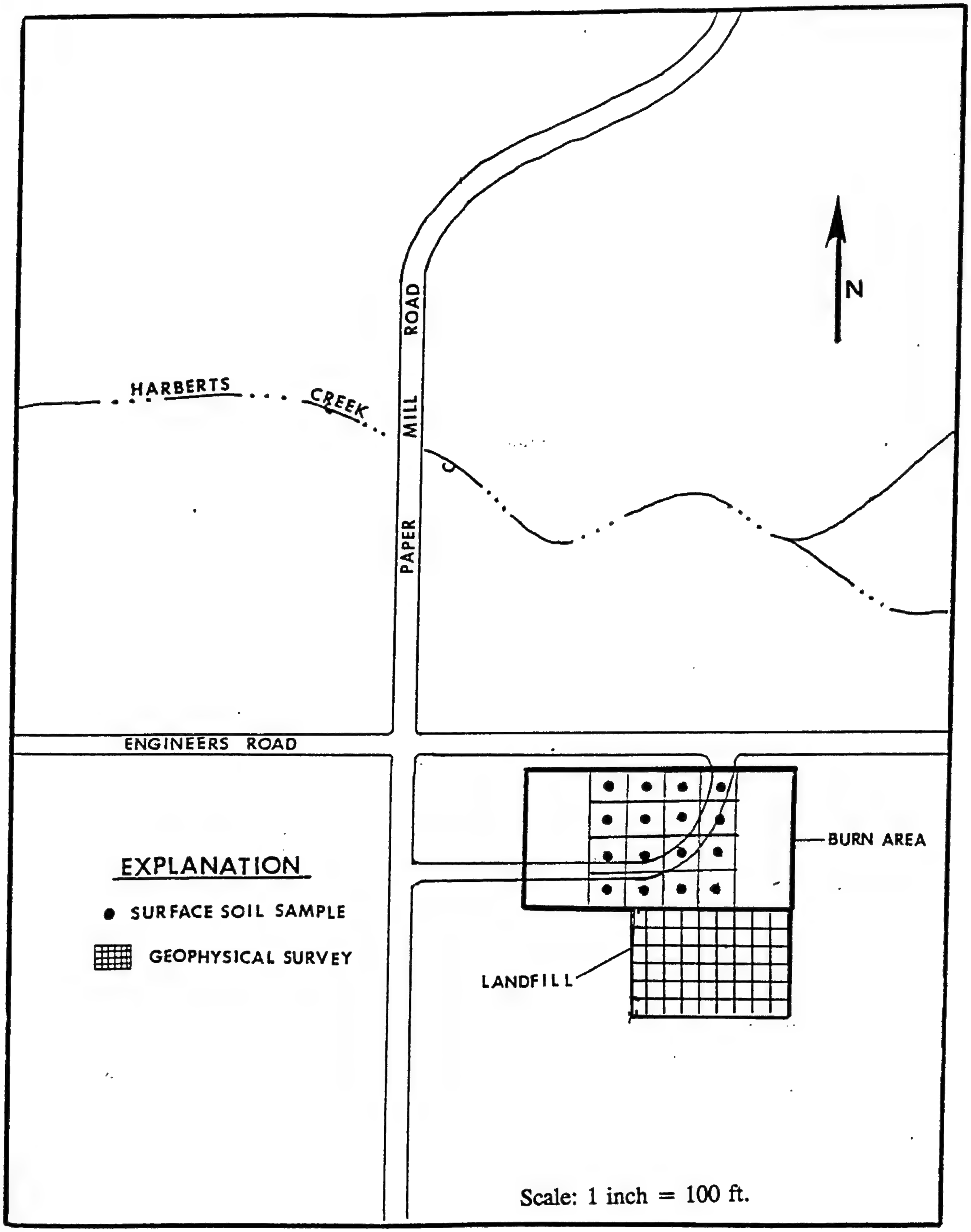


Figure 5. Sample Location Map for the Explosive Burn Area and Abandoned Landfill

4.4.3 *UXO Screening*

Due to the unknown nature of the contents of the abandoned landfill, UXO personnel will be utilized to provide surface and downhole screening support for UXO. Each boring location will be scanned with a magnetometer prior to the start of drilling. Once a depth of 5 ft. has been reached, the augers will be pulled and the drill rig moved to allow downhole logging for buried metal objects. This protocol, required by USATHAMA, will be followed for every 5 ft. of drilling. If a location cannot be cleared, the location will be moved to a location that can be cleared.

4.4.4 *Groundwater Monitoring Well Installation and Sampling*

If subsurface soil samples are found to contain above background concentrations of contaminants, 2 downgradient and 1 upgradient monitoring well(s) will be installed. Drilling will proceed to the top of the water table and will be continued another 8 ft. to allow the installation of 10 ft. of screen with the top 2 ft. of the screen being above the water table to allow for fluctuations in water levels. The installation of monitoring wells will conform to all USATHAMA Geotechnical Requirements (Appendix B).

Groundwater samples will be collected from each well following proper development and purging. Detailed procedures to be used in the collection of groundwater are located in Appendix A. Groundwater samples will be analyzed for contaminants of concern as determined by subsurface soil sampling analytical results or by review of previous investigations of installation operations.

4.5 Wood Storage Piles

The Wood Storage Pile, referred to as site JPG-007, consists of a 10 ft. high used wood stockpile covering approximately 300 sq. ft. on an abandoned airport runway (Figure 6). The stockpile consists of wood debris, plywood struts, boxes, pallets, and used crates that were placed on the runway since about 1975. The second wood pile, referred to as site JPG-008, is an open waste pile on the abandoned runway which received pentachlorophenol (PCP)-treated wood from about 1975 through 1990. A portion of the PCP wood pile was reportedly burned as a result of a lightning strike. It is suspected that residue PCP and dioxin may be present in areas where wood has been burned. Ash and other evidence indicates that previous burning of the wood pile may have occurred.

4.5.1 *Evaluation of Existing Data*

No data currently exists for the 2 wood storage sites. A previous report (Ebasco, 1990b) recommended no further action was needed for these 2 locations. However, limited soil contaminants have been released and transported to surface soils via storm runoff. To determine the extent of this release, 4 surface samples will be taken and analyzed for VOCs, semi-VOCs, PCP, and dioxin.

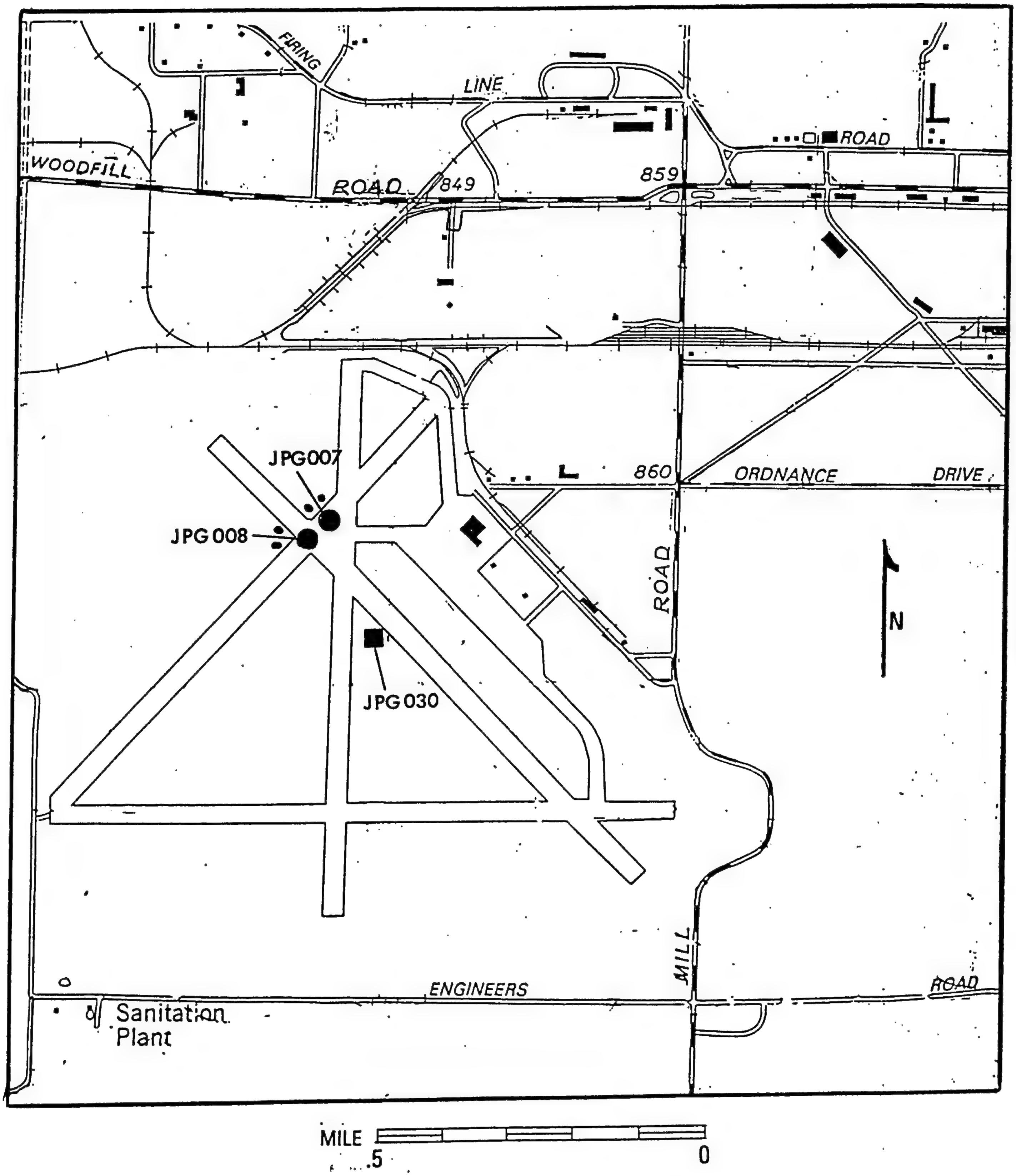


Figure 6. Sample Location for Wood Piles (JPG-007 and JPG-008)

4.6 Red Lead Disposal Area

4.6.1 *Test Corings*

In the area of reported red lead disposal, 3 parallel lines will be established using a tape and line-of-site for a distance of 200 ft. for each line (Figure 7). Pin flags will be established every 20 ft. along these lines. At each pin flag location, a stainless steel hand coring device will be used from the surface to a depth of 2 ft. to obtain a soil core. The soil core will be removed from the coring device and will be visually examined for evidence of red lead or barium sulfate disposal (coloration, staining, layering, debris, or other evidence of past disposal activities). This protocol will continue until evidence of the red lead disposal site is obtained.

4.6.2 *Soil Core Sampling*

For those locations where visual evidence exists, the core samples will be collected and analyzed for TCLP metals.

4.6.3 *Soil Borings and Sampling*

On the basis of soil core analysis, a minimum of 4 soil borings will be drilled using a hollow stem auger rig to a depth of 10 ft. at locations found to contain heavy metals. Samples from these borings will be collected using a stainless steel split-barrel sampler at depths of 2-4, 4-6, 6-8, and 8-10 ft. to determine the vertical distribution of metals contamination.

4.6.4 *Groundwater Monitoring Well Installation and Sampling*

If soil sample data collected from the 10 ft. interval indicates that elevated concentrations of metals are present at depth, 2 downgradient monitoring wells and one upgradient monitoring well will be drilled, installed, and sampled to determine if releases of metals at this site have impacted groundwater quality. Monitoring well installation will be completed in accordance with USATHAMA geotechnical requirements (Appendix B). Detailed procedures for sample collection are presented in Appendix A.

4.7 Small Arms Firing Range

4.7.1 *Sampling of Suspected Asbestos-Containing Materials*

Pieces of wall tile suspected to contain asbestos will be collected and sent for laboratory analysis for asbestos. This sample will be a composite sample of material collected from several tile locations within the building.

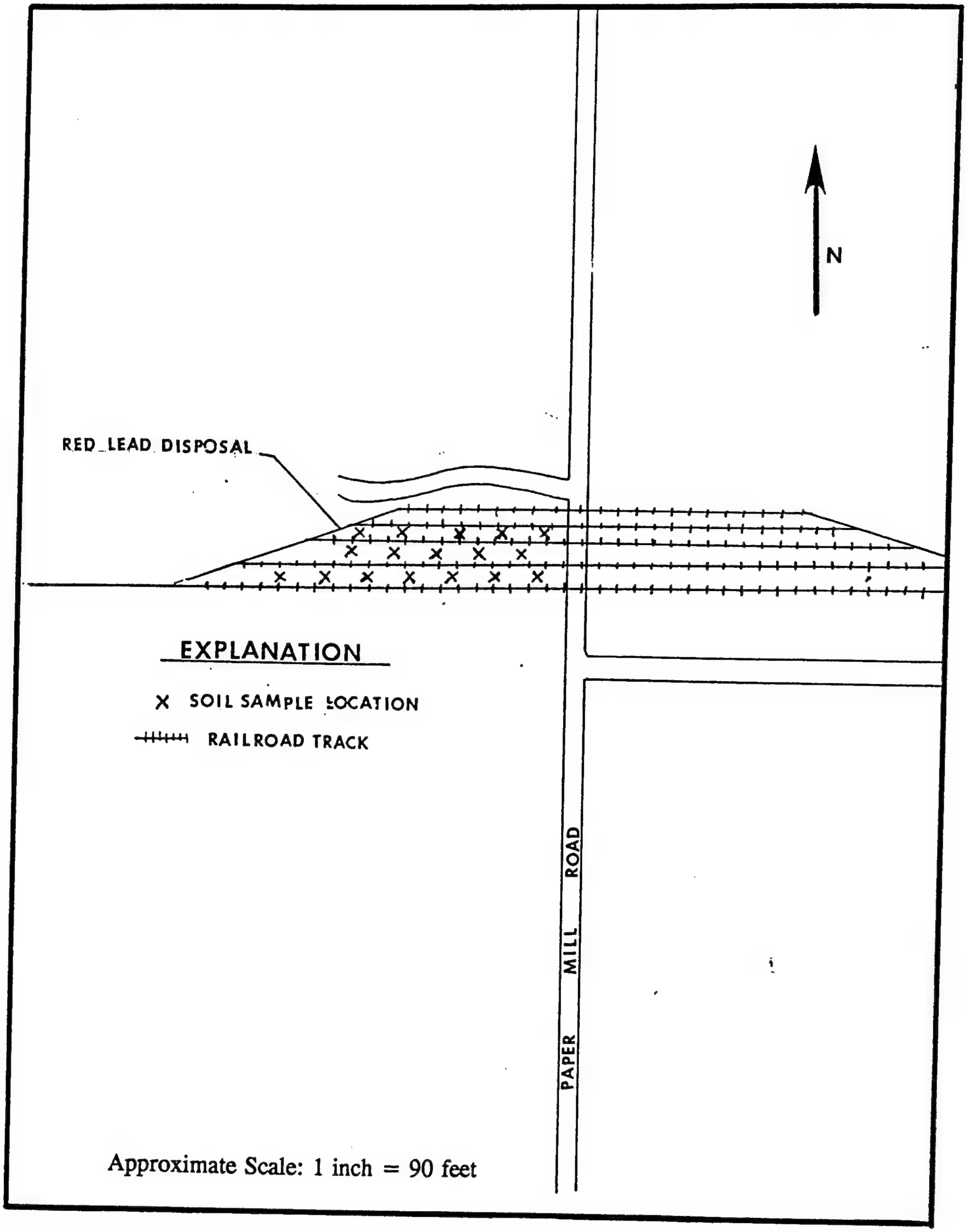


Figure 7. Sample Location Map for the Red Lead Disposal Area

4.7.2 *Unidentified White Powder Sampling*

One composite sample of the white material observed in an abandoned test facility will be collected and analyzed for explosives and TCLP metals.

4.7.3 *Wipe Sampling*

Wipe samples will be collected from the walls, floor, and ceiling of each firing range to determine the amount of residual metals from previous testing of small arms. The wipe samples will be analyzed for heavy metals. Approximately 10 wipe samples will be collected from each firing lane.

4.8 Burning Ground (South of Gate 19 Landfill)

4.8.1 *Geophysical Surveys*

A magnetometer and GPR survey will be conducted to help define the location of pits and trenches in the former burning area south of the Gate 19 Landfill. These surveys will be conducted on a 20 ft. grid spacing across the suspected burning site location (Figure 8). A plot of the results will be generated and anomalies will be plotted and interpreted. If necessary for better definition, the areas containing geophysical anomalies will be resurveyed using a closer spacing (i.e., 10 ft. spacing).

4.8.2 *Soil Borings and Sampling*

On the basis of the geophysical survey, soil borings will be drilled on the outside perimeter of any pits or trenches identified. These borings will be drilled with a hollow-stem auger to a depth of 10 ft. with samples being collected at the surface, 4-5 ft., and 9-10 ft. with a stainless steel split-barrel sampler. Samples collected will be analyzed for VOCs, semi-VOCs, TCLP metals, and explosives.

4.8.3 *Surface Soil Sampling*

If visual evidence of surface burning is present, 4 surface soil samples will be collected from each surface burn are identified (i.e., debris or surface staining). These samples will be grab samples from a depth of 0-6 inches using a stainless steel scoop. These samples will be analyzed for VOCs, semi-VOCs, metals, and explosives.

4.8.4 *UXO Survey*

Prior to the start of work at the burning ground site, a surface sweep of the area will be conducted by UXO personnel. At locations of proposed soil borings, a magnetometer survey of the drill area will be conducted for UXO. As drilling proceeds, downhole screening of

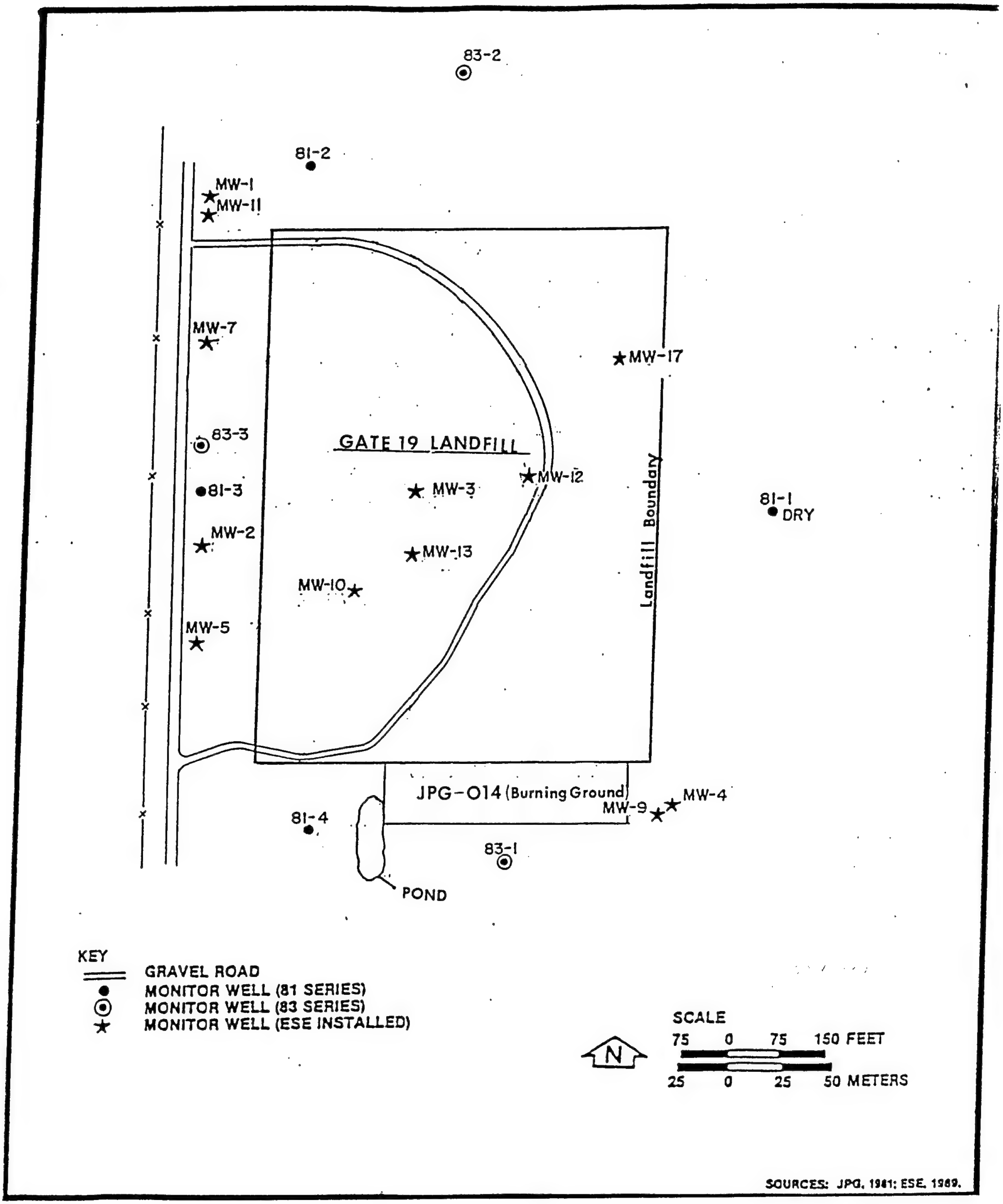


Figure 8. Location of Burning Ground (JPG-014) and Gate 19 Landfill (JPG-015) Survey Areas

the borehole by UXO personnel will be performed every 5 ft. for the presence of buried metal. For any boring that cannot be cleared by UXO screening, the boring will be relocated. Direct drilling of pits and trenches will be avoided due to the unknown nature of the materials potentially disposed of at the site.

4.9 Gate 19 Landfill

4.9.1 *Geophysical Surveys*

Magnetometry and GPR surveys will be conducted across the Gate 19 Landfill to locate specific disposal areas of metal wastes which may represent drums, paint containers, pesticide containers, etc. The survey will be conducted using a 20 ft. grid spacing. Anomalies will be identified on a plot of the landfill and will be compared with previous landfill drawings, aerial photography, or disposal records (if available).

4.9.2 *Soil Gas Survey*

Due to the reports of previous solvent disposal at the landfill, a soil gas survey will be conducted using a grid spacing of 100 ft. across the landfill area (Figure 8). Soil probes will be driven to a depth of 4 ft. and following the purging of air from the probe, a syringe sample of soil gas will be obtained and will be analyzed on-site using a portable Gas Chromatograph (GC) for BTEX. Plots of the results of GC analysis will be prepared to identify areas where solvent disposal may have occurred.

4.9.3 *Soil Borings and Sampling*

On the basis of both the geophysical survey and soil gas survey results, specific areas of potential contamination will be identified as target areas for soil borings and sampling. Soil borings to a depth of 10 ft. will be drilled using a hollow-stem auger rig around the perimeter of anomalous areas with samples collected from 0-1, 4-5, and 9-10 ft. using a stainless steel split-barrel sampler. Samples will be analyzed for VOCs, semi-VOCs, and TCLP metals. An estimated 10 borings will be drilled yielding 30 soil samples. The surface/near-surface samples will be used to determine if the cover soil has been contaminated or is "clean." This information will be used in evaluating the potential for contaminant migration via the surface water pathway and to determine risks associated with the air pathway (i.e., particulates, VOCs).

4.10 Burning Area for Explosive Residue

4.10.1 *Surface Soil Sampling*

Biased sampling will be performed at the burning area with sample locations determined on the basis of discolored gravel or surface soil staining. Approximately 10 surface soil samples will be collected (0-6 inches) with a stainless steel scoop from these stained areas. The

samples will be analyzed for TCLP metals, explosives, and herbicides. In addition, one of the samples will be analyzed for VOCs and semi-VOCs to determine if an organic catalyst used for igniting the explosive residue resulted in organic compound contamination. Soils will be scanned with a photoionization detector (PID) at each sample location. The sample location for VOC and semi-VOC analysis will be selected on the basis of this scan.

4.10.2 *Soil Borings and Sampling*

Four of the locations of surface stains will be selected for the drilling of a soil boring using a hollow-stem auger rig to a depth of 10 ft. These borings will be sampled using a stainless steel split-barrel sampler at depths of 0-1 ft., 4-5 ft., and 9-10 ft. These samples will also be analyzed for TCLP metals, explosives, and herbicides. Samples will be scanned with a PID. If elevated readings are encountered, selected samples will be analyzed for VOCs and semi-VOCs.

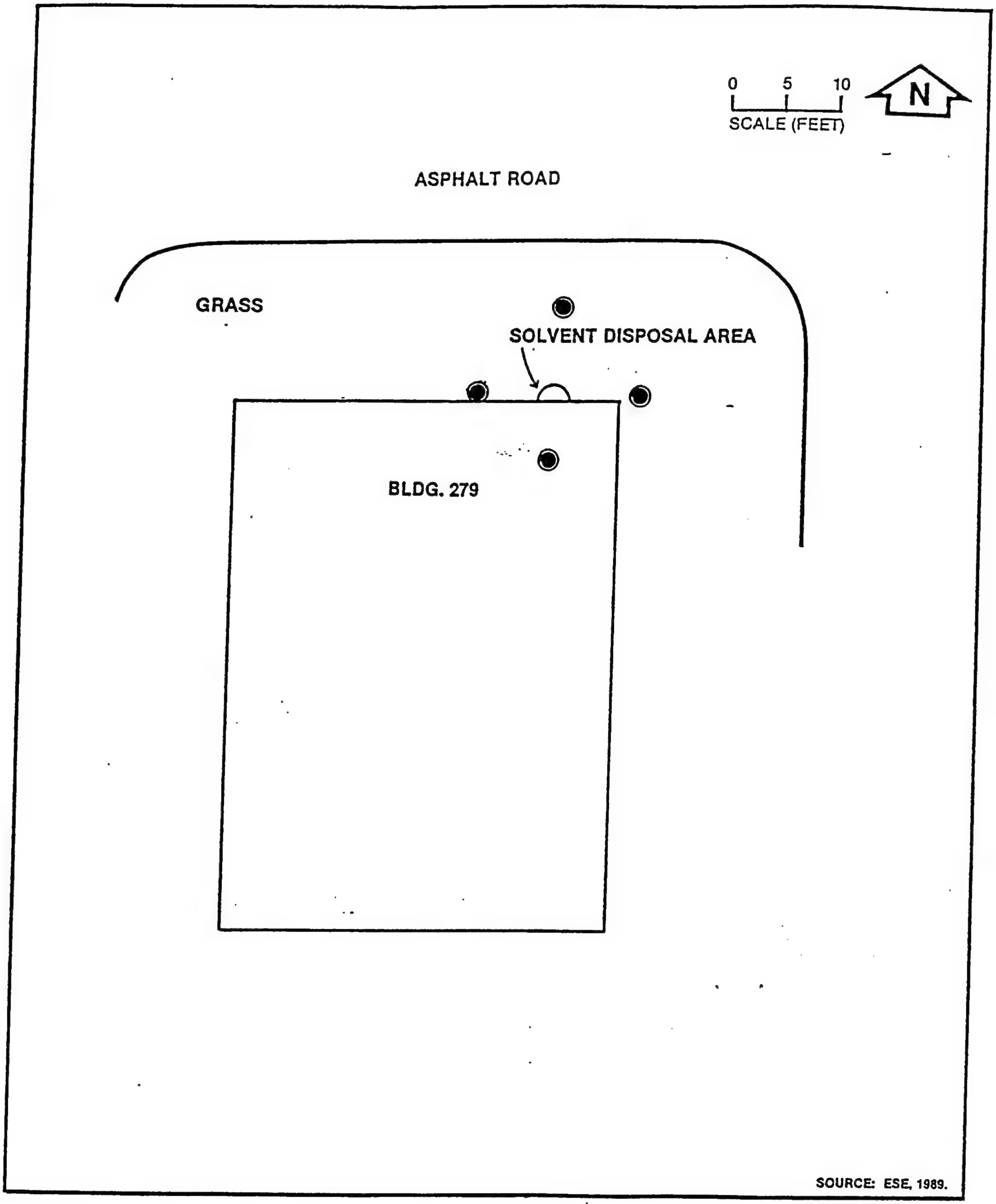
4.10.3 *Groundwater Monitoring Well Installation and Sampling*

If analytical results of subsurface soil samples at the 9-10 ft. level indicate that downward migration of contaminants has occurred, 2 downgradient monitoring wells and 1 upgradient monitoring well will be drilled, installed and sampled to determine the water quality at the burning area. Monitoring well installation will be performed in accordance with the geotechnical requirements established by USATHAMA (Appendix B). Detailed sampling procedures are included in Appendix A. Groundwater samples will be analyzed for TCLP metals, explosives, herbicides, VOCs, and semi-VOCs.

4.11 Building Solvent Pits (Buildings 602, 617, and 279)

4.11.1 *Soil Borings and Sampling*

VOC contamination was previously identified at Building 279 through soil gas sampling. Contaminants were also detected in groundwater from one of the monitoring wells located near the former solvent pit. Four soil borings will be drilled around the perimeter of the solvent pit (Figure 9) to a depth of 10 ft. using a hollow-stem auger rig. Soil samples will be collected using a stainless steel split-barrel sampler at depths of 0-1, 4-5, and 9-10 ft. and analyzed for VOCs. In addition, soil core/cuttings will be scanned with a PID to determine if other zones of contamination exist. Biased sampling may be performed in addition to the specified intervals. One of the soil borings will be drilled within the building through the concrete floor. If access is available, the drill rig will be used. If necessary, a hand-operated power auger will be used within the building instead of the drill rig to assess contamination under the building floor. Coring of the concrete to allow access for the power auger would be accomplished with a diamond bit concrete corer.



SAMPLING LOCATIONS, BLDG. 279

Figure 9. Proposed Sampling Locations at Building 279

Four soil borings will be drilled around the perimeter of the solvent pits at Buildings 602 and 617 (Figures 10 and 11), including one boring within the building as described for Building 279 above. These borings will be sampled using the same sampling protocol used for Building 279. Samples will be analyzed for VOCs.

4.11.2 *Groundwater Monitoring Well Installation and Sampling*

If subsurface soil contamination is present on the basis of soil boring sample results, 1 upgradient monitoring well and 2 downgradient monitoring wells will be installed and sampled and analyzed for VOCs. Monitoring wells will be installed in accordance with USATHAMA geotechnical requirements (Appendix B). Sampling will be conducted according to procedures presented in Appendix A.

4.12 Old Fire Training Pit

4.12.1 *Soil Borings and Sampling*

Four soil borings will be drilled around the perimeter of the old fire training pit using a hollow-stem auger rig (Figure 12). The borings will be drilled to a nominal depth of 15 ft. with samples collected using a stainless steel split-barrel sampler at depths of 0-1, 4-5, 9-10, and 14-15 ft. In addition, one boring will be drilled near the approximate center of the pit using the same sampling protocol. Samples will be analyzed for VOCs, semi-VOCs, and TCLP metals.

4.12.2 *Groundwater Monitoring Well Installation and Sampling*

One upgradient monitoring well and 2 downgradient monitoring wells will be installed at the old fire training pit site if samples collected from the 9-10 or 14-15 ft. intervals contain elevated concentrations of contaminants (through field observation and screening with a PID). If contamination appears to be surface or near-surface, no groundwater monitoring wells will be installed.

4.13 Yellow Sulfur Disposal Area

4.13.1 *Stream Sediment Sampling*

Four sediment samples will be collected from the surface water drainage located adjacent to the yellow sulfur disposal area. These samples will be collected from points within the drainage located approximately every 50 ft. downstream of the sulfur disposal site (Figure 13). The sediment samples will be collected as grab samples using a stainless steel scoop from a depth of 0-6 inches. The samples will be analyzed for sulfur, TCLP metals and pH.

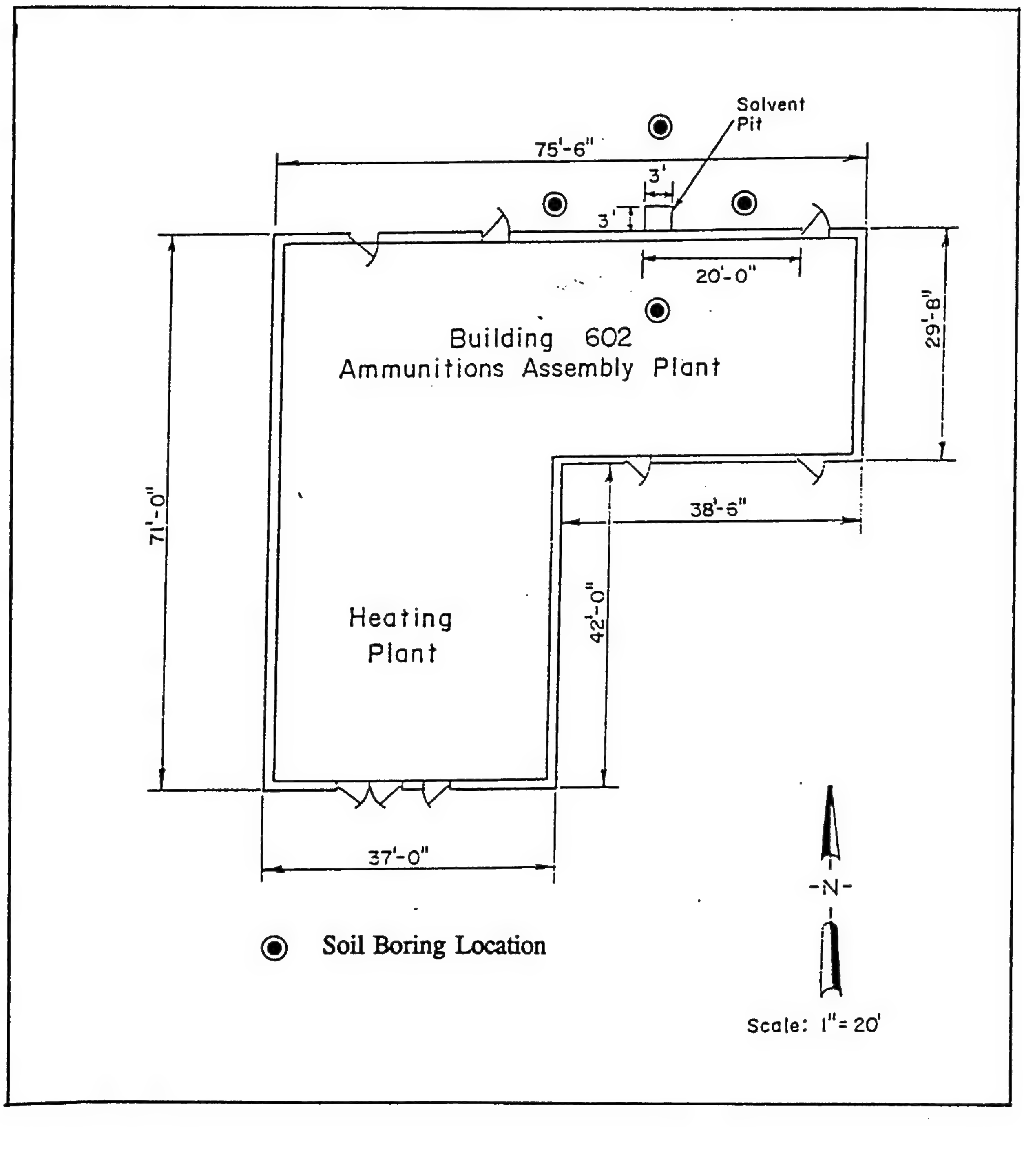


Figure 10. Proposed Sampling Locations at Building 602

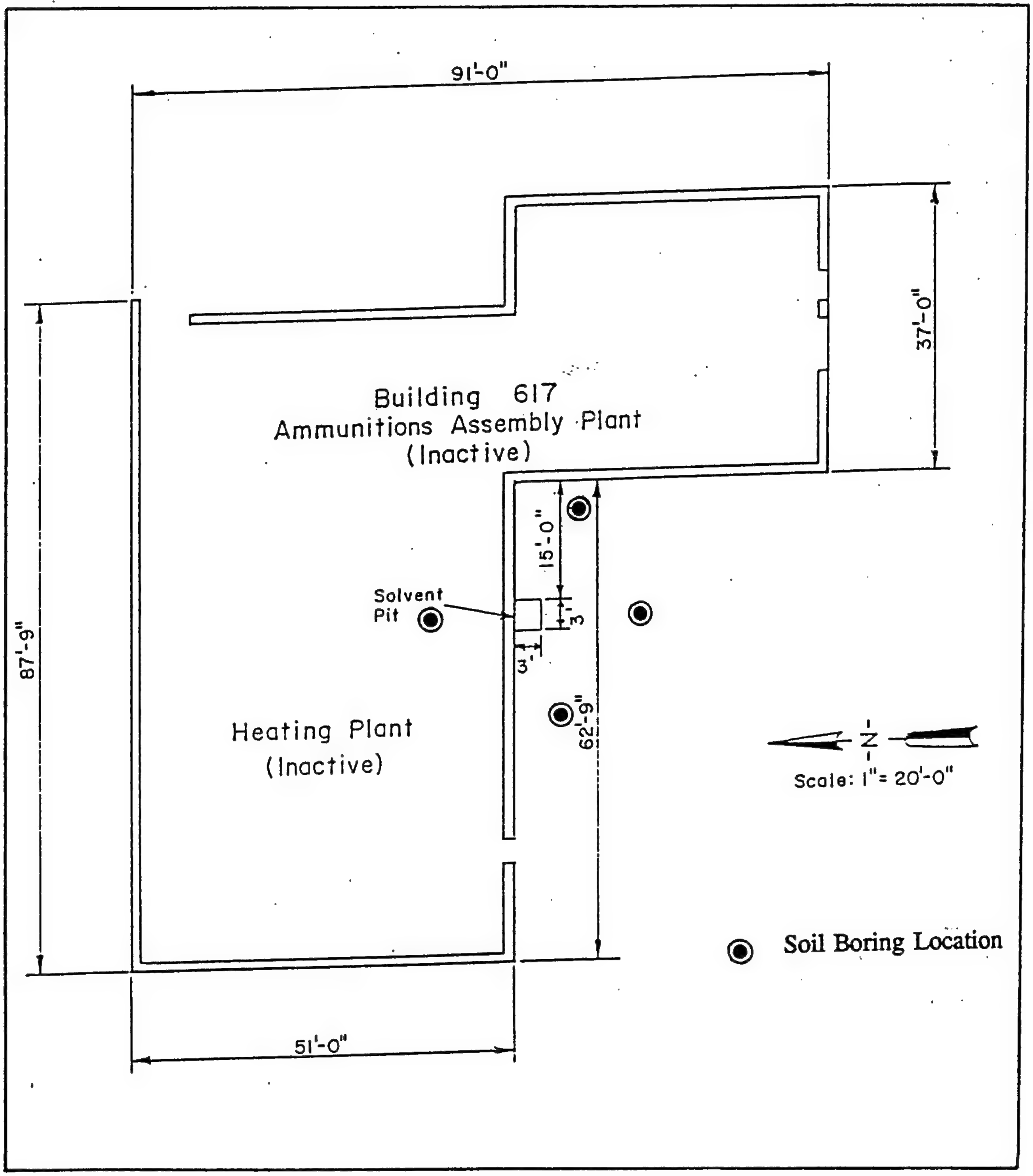


Figure 11. Proposed Sampling Locations at Building 617

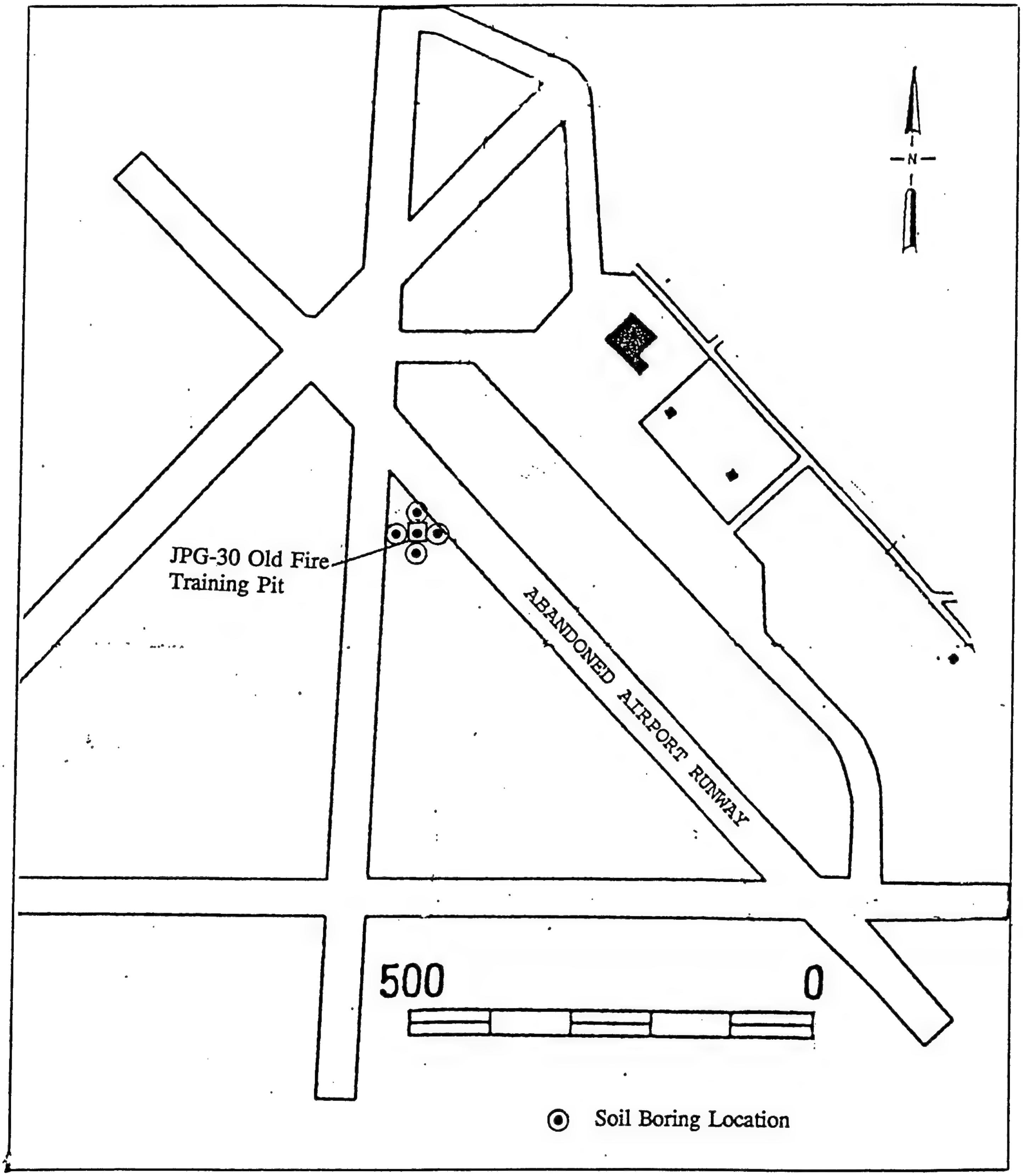


Figure 12. Proposed Sample Locations at the Old Fire Training Pit (JPG-030)

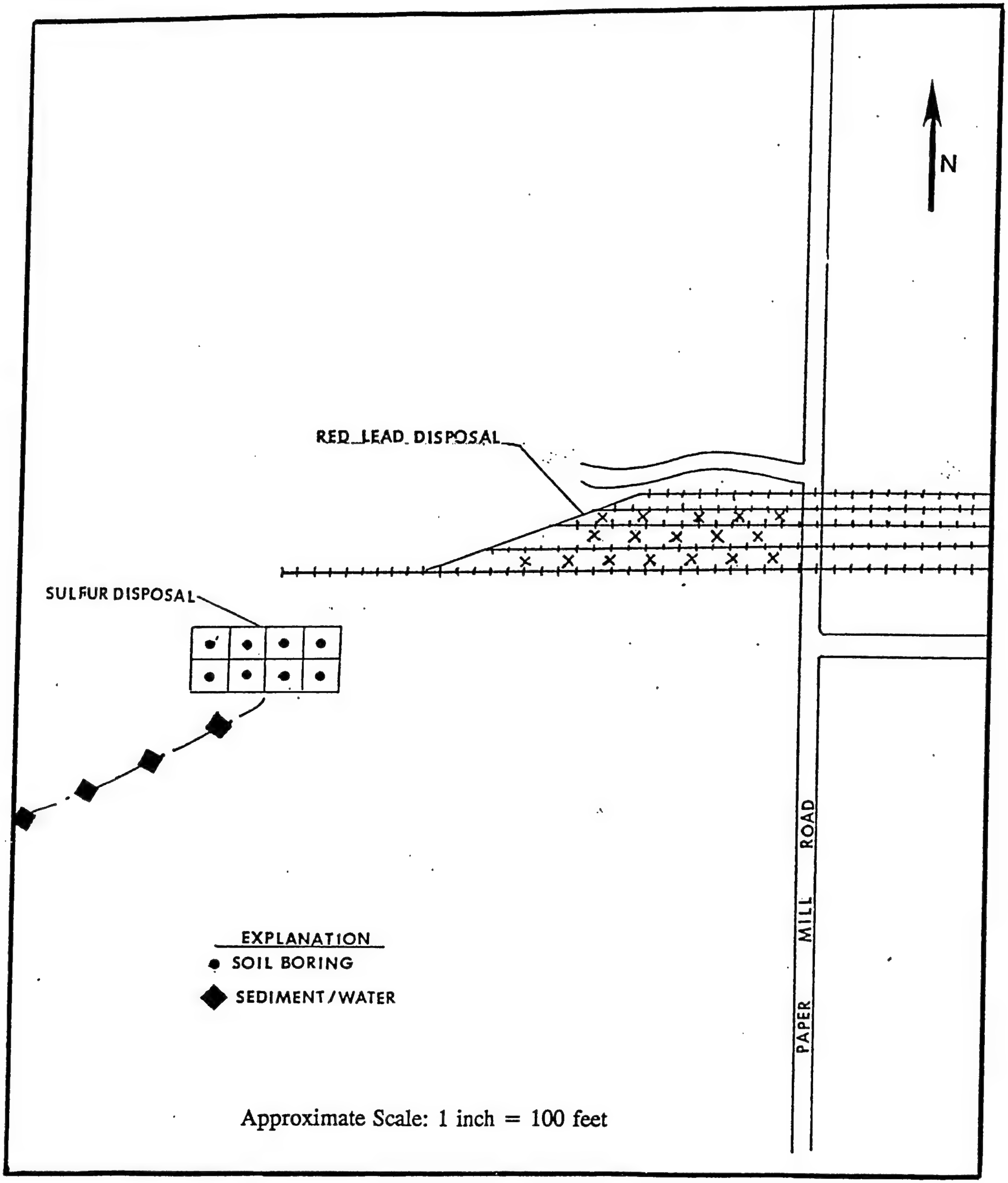


Figure 13. Sampling Locations at the Sulfur Disposal Site

4.13.2 *Surface Water Sampling*

Four surface water sample will be collected at the same locations as the sediment samples if running surface water is present at the time of sampling. These samples will be collected by immersing the bottle(s) with the mouth of the bottle pointing upstream until the bottle is filled. These samples will also be analyzed for sulfur, total metals, inorganics (non-metal), and VOCs. Measurement for pH, conductivity, and temperature will be taken in the field at the time of sample collection.

4.13.3 *Soil Borings and Sampling*

A grid will be established across the sulfur disposal area with a grid spacing of 20 ft. Eight soil borings will be drilled from the surface to a depth of 10 ft. Soil samples will be collected using a stainless steel split-barrel sampler at depths of 0-1, 4-5, and 9-10 ft. Samples will be analyzed for sulfur, total metals, and inorganics. In addition, the soil cores will be scanned with a PID and, if VOCs are detected, biased samples will be collected for VOC analysis.

4.13.4 *UXO Screening*

Since the disposal site may have been a landfill area for other types of materials, UXO personnel will survey each boring location for UXO and will monitor the borings at 5 ft. for buried metal to ensure the safety of the drilling and sampling crew.

4.13.5 *Monitoring Well Installation and Sampling*

If analytical results from subsurface soil samples indicate that contaminants are migrating from the sulfur disposal area to the groundwater pathway, 1 upgradient monitoring well and 2 downgradient monitoring wells will be installed and sampled. Well installations will be in accordance with USATHAMA geotechnical requirements (Appendix B) and will be sampled according to procedures presented in Appendix A. Groundwater samples will be analyzed only for the contaminants of concern as determined from the results of subsurface soil sampling and analysis. Water quality parameter (pH, conductivity, and temperature) will also be taken at the time of sample collection. This is particularly important at this site since the presence of sulfur in groundwater often results in highly acidic conditions (pH $\leq$ 2).

4.14 Burn Area South of New Incinerator

4.14.1 *Surface Soil Sampling*

Four near-surface soil samples will be collected around the perimeter of the concrete pad to a depth of 0-1 ft. The samples will be analyzed for explosives, metals, VOCs and semi-VOCs.

4.14.2 *Wipe Samples*

One wipe sample will be collected from the center of the concrete pad and analyzed for explosives, metals, and VOCs.

4.15 Potential Ammo Dump Site

4.15.1 *UXO Surveys*

Prior to start of any other activities, an initial surface UXO survey will be made of the potential dump sites.

If no surface UXO is encountered and subsequent geophysical surveys locate the dump site, additional UXO surveys will be accomplished by excavating test pits for the purpose of identifying the contents of the dump site.

4.15.2 *Geophysical Surveys*

Magnetometer and GPR surveys will be conducted using a 50 ft. grid spacing over the suspected dump site.

If anomalies are present, a closer spaced survey will be conducted to determine the exact location and estimated depth of the disposal site.

4.15.3 *Test Pits*

If the site can be properly located, 2 test pits will be carefully dug using an experienced backhoe operator and a qualified UXO team. UXO scans will be conducted for every 1 ft. as the test pit is deepened. Any items uncovered during the operation will be inspected by UXO support personnel for identification and evaluation of condition. Disposal will be the responsibility of JPG personnel.

4.16 Asbestos-Containing Materials

4.16.1 *Suspected Asbestos Materials Sampling*

On the basis of building survey, all materials suspected to contain asbestos, but not previously confirmed, will be collected and sent to the laboratory for analysis and identification.

4.17 Underground Storage Tanks

4.17.1 *Subsurface Soil Sampling*

Following a review of all previous UST leak testing results and previous soil sampling results, those USTs where releases of contaminants to the environment are known or suspected to have occurred will be characterized for contaminant release by subsurface soil sampling and analysis.

At each UST location, 4 borings will be drilled around the perimeter of the tank or former tank site. These borings will be drilled to a depth of 10 ft. with a hollow-stem auger rig and samples will be collected using a stainless steel split-barrel sampler. Samples will be collected from 3-4, 5-6, 7-8, and 9-10 ft. intervals resulting in an estimated 16 samples per UST location. The samples will be analyzed for TPH and BTEX.

4.18 Off-Site Water Supply Wells

Two drinking water wells (Well #1 and #2), located near the Madison Country Club in downtown Madison, were formerly used to supply drinking water to JPG. Presently, JPG receives its water from the City of Madison and the wells are no longer used.
A generator was housed in the building for emergency power to the pumps. Associated with this generator were 2 USTs (one 500 gallon and one 1,000 gallon) for storage of diesel fuel. A potential exists for leakage from these tanks. The pumps for the 2 wells reportedly leaked oil onto the base plate and may have leaked oil into the well casings. Paint in the pump houses may contain lead.

Limited data is available for this site. Six subsurface samples will be taken to determine if contamination exists. These samples will be analyzed for TPH and BTEX.

5.0 FIELD METHODS

The following section describes the methods for the collection of field measurement and sample data proposed in Section 4.0 and the procedures to be followed to ensure that only quality data is obtained. It also provides requirements for sample identification, sample-handling, and storage. Field Quality Assurance/Quality Control requirements are briefly discussed, but are presented in more detail in the Quality Control Plan (Volume III). Unusual field sampling conditions may require departure from the procedures described in this plan. Such occurrences will be fully documented in the field logbooks for the affected site(s). All changes should be brought to the attention of a USATHAMA representative for concurrence or approval.

5.1 UXO Clearing

Past activities at JPG may have resulted in UXO and/or reactive soil hazards being present in areas to be studied under the RI/FS. Detailed procedures for UXO clearing for health and safety purposes is presented in the site-specific Health and Safety Plan (Volume IV). For all UXO clearance activities, personnel will comply with U.S. Army Series 60 Manual for handling ordnance items and will follow current USATHAMA Safety Office guidance (USATHAMA, 1987). In addition, the following conditions will be met by the EOD subcontractor:

- Standard Operating Procedures will be maintained on-site for all UXO procedures.
- Communication equipment (i.e., radios or cellular telephone) will be available to EOD personnel to allow direct contact with emergency response personnel.
- UXO operations will be conducted only during daylight hours and proper weather conditions (activities should not be conducted during severe weather conditions such as lightning storms).
- A minimum of 2 EOD personnel will be present at all times during UXO surveys.
- EOD personnel clear all work crews from the area upon locating UXO, will notify appropriate installation personnel of any UXO encountered, and will arrange for rendering safe and disposal of UXO prior to any further work being conducted at the affected site. Any such rendering and disposal activity must be approved by the USATHAMA Health and Safety Branch.
- A visual walkover UXO scan will be completed in areas where geophysical surveys are to be conducted.
- UXO support will be provided for any drilling or trenching in areas where buried trenches, pits, or landfills are suspected. This will involve subsurface scans for UXO. Any encountered ordnance will result in the abandonment of the boring or trench. EOD personnel will provide site security until a decision can be made on the disposition of the ordnance by installation personnel.

The subcontractor will maintain a logbook of all UXO survey operations and results and will prepare a final report at the completion of activities which summarizes all findings including the location of all UXO encountered whether determined safe or hazardous. Any surface UXO will be left in place, but will be clearly marked with a fluorescent pin flag and the location will be plotted on a sketch map for installation identification, assessment, and disposal.

5.2 Geophysical Surveys

Geophysical surveys will be conducted at JPG to locate former areas of landfills, trenches, or pits used for burning or disposal that have since been covered and, in many cases, revegetated. The geophysical technique(s) to be used at each site will be dependant on site conditions. The recommended surveys are magnetometry and ground penetrating radar, although other techniques may be considered. The magnetometer survey will be conducted

at each location first to allow detection of buried materials which in turn will allow focus of specific areas for GPR, thereby allowing better definition of trench, pit or landfill boundaries.

5.2.1 *Magnetometry*

Magnetometry is routinely used to locate buried metal objects such as tanks, drums, scrap metal, etc. Magnetic instrumentation measures small perturbations in the earth's magnetic field produced by local geologic and cultural features.

A Vertical Magnetic Gradiometer is recommended for initial surveys. A typical gradiometer is a proton precession magnetometer with 2 sensors mounted from 0.5 to 1.0 meters apart on a staff which is held vertically while a measurement is taken. Total magnetic field values are taken simultaneously on both sensors, and the difference of the values between the sensors divided by the distance between them is the vertical gradient value. Vertical gradient data is more sensitive to the presence of ferrous metallic debris than total magnetic field data alone.

Grid systems will be laid out for each area to be surveyed using a measuring tape and line-of-site between grid stakes which will be initially established around the perimeter of the survey area (typically every 100 ft). Pin flags or small stakes will be placed between the initial perimeter stakes on an established spacing that is appropriate for each site (typically 10 or 20 ft.). The survey grid will be tied to a known coordinate system (i.e., State Planar, UTM, or JPG coordinate systems).

5.2.2 *Ground Penetrating Radar*

GPR will be performed utilizing the previously established magnetometer grid if additional definition of trench, pit, or landfill boundaries are required. GPR uses electromagnetic waves in the frequency range of 80 to 1,000 megahertz to define subsurface stratigraphy. With the GPR technique, electromagnetic energy is radiated into the subsurface from an antenna that is pulled slowly across the ground by hand at speeds varying from about 0.25 to 5 miles per hour, depending on the amount of detail desired and the nature of the target. The radio wave energy is reflected from surfaces where there is a contrast in electrical properties of subsurface materials. These surfaces may be naturally occurring geologic horizons or manmade. The reflected energy is processed and displayed as a continuous strip chart recording of distance versus time, where time is approximately proportional to depth. For areas where material was removed (i.e., trench) and subsequently refilled with contrasting material, GPR can accurately determine the boundaries of the area due to the contrast in reflected energy.

The same grid system will be utilized for the GPR survey, although the spacing within the grid may vary according to site conditions.

5.3 Monitoring Well Installation

Monitoring wells will only be installed as part of this RI if the results of subsurface soil sampling data indicate that a release of contaminants to the groundwater pathway has occurred. Drilling will be performed by a qualified drilling contractor familiar with USATHAMA geotechnical requirements and State of Indiana regulations governing drilling and abandonment.

5.3.1 *Drilling*

Hollow-stem auguring will be conducted to advance the borehole to bedrock. Once bedrock has been reached, mud-rotary drilling will be used to drill the hole to total depth. The mud used for the drilling will be made using approved water and pure Wyoming bentonite. The resulting cuttings and mud will be directed to a mud tank where the drilling fluids will be screened and the cuttings removed.

A boring log will be maintained for each borehole as it is drilled which will contain all of the information required by USATHAMA (see Appendix B). These logs will be provided to USATHAMA at the completion of drilling and the resulting data will be entered into the IRDMIS data base (i.e, map files). Figure 14 is an example of a boring log used to record the required information.

5.3.2 *Well Installation*

Well installation will begin within 48 hours of boring completion and will continue until completion without interruption.

Well casing and screen will be 4-inch, Schedule 80, threaded PVC. No PVC solvents will be allowed. All screens will be 10 ft. in length with a slot of 0.010 inch with a threaded bottom cap or plug. All well screen and casing materials will be steam cleaned prior to installation in the borehole. A solid riser above the screened interval will extend to approximately 2.5 ft. above the ground surface. Sand pack, approved by USATHAMA, will be installed around the well screen to 5 ft. above the well screen. A 5 ft. thick bentonite seal will then be placed above the sand pack using USATHAMA-approved bentonite pellets. The seal will be allowed to hydrate 1-2 hours prior to the installation of cement-bentonite grout to the ground surface. The grout will consist of 20 parts Type II or V Portland cement to 1 part bentonite with a maximum of 8 gallons of approved water per 94-pound bag of cement. These proportions may be modified with USATHAMA approval if field conditions dictate. An 8-inch ID protective casing will be installed around the wells. This casing will extend approximately 2.5 ft. above ground surface (0.2 ft. above the top of the PVC casing) and will be seated 2.5 ft. into the well grout. This casing will have a hinged and lockable cap. The locks will all be keyed the same with at least 5 copies provided to JPG personnel at project completion. After the installation is complete, a mortar collar will be installed between the well casing and protective casing, and a 1/4-inch-diameter drain hole will be

Boring Log

Project Site____

Site ID ____________________ Auger Size________________________

Date/Time Started ________________ Date/Time Completed______________

Surface Elevation (optional) ____________ Water Level (from GroundSurface) ______________

Completion Depth ________ Drilling Co.____________ Driller___________

Drilling Type __________ Sample Type _________ No. of Samples__________

Geologist/Logger & Co. ____

Figure 14. Boring Log

BORING LOG GENERAL DATA

Project: | Boring: | Page: 1 of

Driller & Company:

Geologist/Logger & Company: | Signature:

Date Boring Started: | Completed:

Water Levels (From Ground Surface) | Drilling Rig:

First Encountered: | Date:

While Drilling: | Date:

At Boring Completion: | Date:

Drilling Shifts:

Date	Time		Depth of Drilling Per Shift		Date	Time		Depth of Drilling Per Shift	
	Start	End	Start	End		Start	End	Start	End

Abbreviations:

Abbr Meaning

Location Sketch:

Figure 14 Continued

BORING LOG (cont'd)

Project:			Boring:		Page: of
Depth/ Eval.	USCS Symbol/ Core Sketch	Soil/Rock Description	Sample No. & Depth	Blow Count & Recovery	Drilling Data

Figure 14 Continued

installed in the protective casing immediately above the mortar collar near the ground surface. Four iron/steel protective guard posts with a diameter equal to or greater than 3 inches will be installed around the well and painted with high visibility orange paint. At that time, the monitoring well will be properly labelled using a welder and white paint to permanently mark the well number on the protective casing.

5.3.3 *Well Development*

Initial well development will begin no sooner than 48 hours, but no later than 7 days, following well installation. Field data collected during well development will be submitted to USATHAMA within 3 working days after well development.

Development of the wells will be accomplished with an electric-powered submersible pump and/or bailer. All development equipment/materials will be steam-cleaned prior to use at each well location. Pumping of the well will continue until the water is clear to the unaided eye and the well is free of sediment (less than 1% of the screen length), and the total volume of water removed from the well is at least 5 times the standing water volume in the well (assuming 30% porosity within the sand pack). A sample of the last water obtained from the development process will be retained as required by USATHAMA.

A well development record will be maintained containing all of the pertinent information required (i.e., date, static water level before and after development, quantity of standing water prior to development, water quality parameters before, during (at least 3 times), and after development, total well depth, screen length, equipment used, quantity of water removed, etc.). An example of a well development log is shown in Figure 15.

5.4 Sample Collection

5.4.1 *Sample Identification*

Each sample will be assigned a unique identification number that will be easily identifiable as to the project (JPG), site number (i.e., 015 = Gate 19 Landfill), sample media type (i.e., GW = groundwater), and location. For example, JPG-015-GW-01 would be assigned to the sample collected from monitoring well MW-1 at the Gate 19 Landfill.

5.4.2 *Sample Requirements*

The laboratory requirements for sample containers, preservation, and holding times for each media sampled as presented in USATHAMA PAM 11-41, Rev. 0, Table H-1 are listed in Appendix A, pg. A-29.

5.4.3 *Sample Handling, Storage and Shipping*

All containers used will be pre-cleaned and obtained from a USATHAMA- and EPA-approved supplier. Containers will be visually inspected for integrity and cleanliness prior to

Well Development Record

Project TEAD - South Area

Geologist J C Brown

Well No. 135 87 91

Date of Installation 5-14-91

Well Information

Total Depth 15.42

Casing Stickup (PVC) Flush

Screen Length

Amt. of fluid in well (Prior to development)

In well casing 3.64

In sat. annulus

(30% porosity)

Amt. of mud/water lost

During drilling

During fluid purging

Development

Date/time started 5-17-91 14:15

Completed 5-17-91 1600

Water level

Before development 11.78

24 hrs. after

Depth to sediment

Before development None

After development None

Measurement	pH	Specific Conduct.	Date	Time	Vol. Wtr. Removed
Before Development					
1	7.3	1700	5-17-91	1415	1 gal
2	7.18	1400		1430	10
3	7.30	1400		1440	22
4	7.37	1400		1453	35
5	7.32	1400		1500	50
After development					

Surge technique Bailer

Type, size and capacity of bailer or pump 3" X 3' PVC Bailer

Physical character of water removed (clarity, color, odor, particulates, etc.)

Milky, No oder or Coarse-grained sediment

Quantity of fluid removed

Time for removal

Note: all depths measured from top of casing

SOUTH TOOELE RFI PHASE II — FIELD OPERATING PROCEDURES

EXHIBIT 4-2

Figure 15. - Example of Well Development Record

use. Suspect containers will not be used and will be labelled "Do Not Use" or will be discarded.

Sample bottles for liquid inorganic analyses will be filled to approximately 90% of capacity to allow for expansion of the contents. Sample bottles for organic analyses will be filled with minimum headspace. The 40-milliliter vials used for volatile organic analysis will be filled with no headspace or bubbles.

Sample preservation will be performed immediately upon collection. For acidified samples, pH will be checked to ensure proper preservation. Ice chests will be used to cool samples during the sampling event and will also be used for shipping to the laboratory. A refrigerator will be obtained for storing samples that cannot be shipped via overnight delivery. This refrigerator will be kept in a locked room or, at a minimum, will have chain-of-custody seals placed on the door to ensure sample custody was maintained.

Those samples that have background-to-low-levels of contaminants will be handled, packaged, and shipped as environmental samples. Those samples that contain high concentrations of contaminants on the basis of field screening methods, will be handled, packaged, and shipped according to the regulations issued by the U.S. Department of Transportation (DOT), 49 CFR Parts 171 through 178, and EPA sampling, packaging, and shipping methods 40 CFR 260.

All samples will be packaged and shipped in a manner that will protect the integrity of the sample as well as protect against any detrimental effects from possible leakage. Packaging and shipping will include placing the container in a zip-lock type bag, packaging in bubble wrap or foam socks, and packing with vermiculite. Shipping containers will be sealed with reinforced tape and will be properly labelled according to DOT guidelines.

Each shipment of samples will be accompanied by a signed chain-of-custody form that specifies the analyses required for each sample and any unique handling requirements based on information obtained in the field.

5.4.4 *Soil Gas Sampling*

At the Gate 19 Landfill site, a grid system will be established for both geophysical survey and soil gas sampling. Each grid location where soil gas samples are to be collected will first be scanned with a magnetometer for shallow buried metal objects. Following clearance of the location, the following basic procedure will be used to collected soil gas samples:

- Drive a 6 to 7 ft. long hollow drive rod with a removable drive tip to a depth of 4 ft. using a fence post driver or hydraulically operated impact hammer.
- Using a hydraulically driven removal jack, raise the rod approximately 6 inches, thereby separating the drive tip from the rod and creating a void for the collection of soil gas.
- Attach a hand operated pump to the rod and purge the rod by pump to ensure that

no surface air is present and that the sample collected will be representative of the subsurface soil gases.

- Following purging, insert a syringe through a septum in the tubing attached to the pump to obtain a soil gas sample. A vacuum canister may also be used in place of the syringe.
- Insert the syringe directly into a portable gas chromatograph that is calibrated for BTEX and analyze. If a canister was used, remove gas from the canister with a syringe and insert the syringe into the GC.
- Remove the drive rod using the hydraulic removal jack and decontaminate the rod with clean potable water and distilled water rinses prior to reuse.

5.4.5 *Surface Soil and Sediment Sampling*

Prior to sampling, the immediate area to be sampled will be cleared of debris or litter. Where warranted, a UXO sweep will be conducted.

For soil and sediment samples to be collected at depths of 0-6 inches, hand operated stainless steel trowels or scoops will be utilized. Samples for VOC analysis will be collected "as-is" and placed immediately into the sample container to prevent volatile loss. All other material will be placed in a stainless steel or glass sampling pan (i.e., cake pan) where the material will be thoroughly mixed with a stainless steel spoon prior to bottling. Where appropriate, the soil will be scanned using a PID immediately following removal to aid in decisions concerning sample packaging, handling, and shipping. All sampling equipment will be decontaminated following procedures outlined in Section 5.7.

For near-surface soil samples to be collected from depths up to 2 ft. (i.e., soil cover placed over landfills, trenches, pits, etc.), a hand-operated, stainless-steel barrel auger may be used. The sampling equipment will consist of a stainless steel auger bit attached to a rod and "T" handle. These devices are capable of sampling to depths on the order of 12 ft. under some sampling conditions. The auger bit is used to bore a hole to the desired depth and is then withdrawn with the sample material contained within the barrel.

Using a stainless steel spoon and/or knife, the sample will be removed from the auger barrel and will be placed in a stainless steel tray for thorough mixing prior to bottling. Samples for VOC analysis, however, will be collected directly from the auger barrel immediately upon removal to avoid loss of volatiles. Where appropriate, the sample will be scanned with a PID immediately following removal. This measurement will aid in decisions concerning sample packaging, handling, shipping, and personnel protection.

Following sample collection, all sampling equipment will be decontaminated according to procedures defined in Section 5.7.

5.4.6 *Subsurface Soil Sampling*

A truck-mounted hollow-stem auger rig will be employed at JPG to complete the subsurface soil sampling. Details of drilling procedures are described in Appendix A.

The hollow-stem auger rig will be used to auger to the desired sampling depth(s). A 3-inch O.D. by 24-inch-long split-barrel sampler will be used (the 3 inch barrel provides sufficient sample volume in cases where a wide variety of analyses are required). The sampler will be lowered to the top of the interval to be sampled. Using a 140 pounds drop hammer or hydraulic driver, the sampler will be driven for the length of the sampler or until no further penetration is achieved after 50 blows for each 6 inches of penetration.

Once the sampler is full or no further penetration is possible, the sampler will be carefully removed from the borehole and separated from the drive-rod assembly. The sampler will be laid flat on an uncontaminated surface and the head and drive shoe removed. One-half of the split-barrel will be removed exposing the sample. The uppermost portion of the sample (slough) will be discarded. The sample will be screened with a photoionization detector while in the split-barrel sampler. Sample material to be analyzed for volatile organic compounds will be removed immediately from the core. The remaining sample material will be placed in a stainless steel mixing pan and will be thoroughly mixed prior to bottling. If a discrete section of the core shows evidence of significant contamination, this section will be sampled without mixing the entire sample core. These samples will be noted in the borehole log or field logbook as being a biased sample.

Following each sample collection, the split-barrel sampler will be steam cleaned or replaced with a precleaned barrel to avoid cross-contamination of the samples or the boring.

All discarded sample materials and drill cuttings will be placed in 55 gallon drums for proper analysis and disposal (see Section 5.8).

For soil borings, a boring log will be maintained that provides at record of lithology, blow counts, and sample depths. These boring logs will be completed according to USATHAMA geotechnical requirements (Appendix B).

5.4.7 *Groundwater Sampling*

Groundwater sampling will occur after monitoring wells have been installed and developed according to the USATHAMA Geotechnical Requirements (Appendix B). Because drilling and well construction disturb the natural groundwater system, a minimum of 2 weeks will be allowed between well development and sampling.

All equipment used for purging, measuring, and sampling will be cleaned before use in each well to prevent cross contamination between wells. Equipment that is dedicated to a well site may not require cleaning between sampling events. Water used for field cleaning of

equipment will be from an approved USATHAMA source (source will have been sampled and analyzed for contaminants prior to use).

Calibration of sampling equipment will be performed in accordance with the manufacturer's suggested procedures and will be completed prior to each day's sampling activities or more often as required. Records of these calibrations will be maintained for each instrument.

Purging. Immediately following removal of the cap for each well, the breathing zone will be checked with a PID to determine ambient air quality and to determine the required personal protective equipment required.

The static water level will be measured using an electronic water-level sounder or interface probe to the nearest 0.01 ft. After the measurement is made and properly recorded, the equipment will be rinsed with clean potable water and distilled water.

The volume to be purged will be calculated on the basis of the total well volume, volume of water in the well annulus and estimated porosity of the sandpack around the well screen. Five well volumes will be calculated for each well prior to the start of purging.

A submersible pump will be lowered to just below the top of the water column and purging will begin. The pH, temperature, and conductivity of the discharge water will be monitored during pumping. The probes will be immersed in a flow-through cell soon after pumping begins. The standard solutions for calibrating the pH meter will be brought to the temperature of the water in the flow-through bath and the meter will be standardized prior to taking the pH measurements. Electrical conductivity will be measured using a conductivity meter that has been calibrated before sampling. The conductivity probe will be placed in the flow-through bath; pH, temperature, and conductivity measurements will be recorded periodically throughout the time of pumping. The samples will be collected after 5 bore volumes have been purged.

All purged water will be containerized pending receipt of laboratory analysis for proper disposal (see Section 5.8)

Sampling. Sample containers will be filled by allowing pump or bailer discharge to flow gently down the side of the bottle with minimal entry turbulence. All sample vials or bottles will be triple rinsed with sample water prior to collection. Where filtration is required, the collected sample will be placed in a clean bottle and passed through a properly prepared filtration apparatus (typically a 0.45-micron cellulose-acetate or nitrate membrane filters in a filter holder with Teflon support screens on the top and bottom of the filter). When sampling from a pump, the filter apparatus can be placed in-line prior to sample collection.

Preservatives, as described in Appendix A, pg. A-29, will be added prior to capping the bottles. Measurements of pH, in the case of acidified samples, will be made immediately upon addition of the preservative.

All purging and sampling equipment will be decontaminated following procedures outlined in Section 5.7.

Well sampling data will be recorded on a groundwater sample collection form which provides a record of all water level measurements, purging, water quality parameter measurements, samples collected, preservatives used, and any other pertinent information.

5.4.8 *Surface Water*

Samples of surface water will be collected by immersing the sample bottle(s) in the surface water body. The bottles will be triple rinsed with the water to be sampled prior to sample collection. The water will be collected from a portion of the water body that is well mixed and representative of the water body. For VOC samples, the bottle will be capped beneath the surface of the water to avoid the trapping of air bubbles. The VOC vial will be inspected for air bubbles following capping. The sampling procedure will be repeated until a sample is obtained free of bubbles.

Measurements of temperature, pH, and conductivity will be made at the time of sample collection and will be recorded on the appropriate sample collection form. These measurements will be taken directly from the surface water body at the time of sampling.

5.4.9 *Drummed Waste Sampling*

A stainless steel 2-inch-diameter hand coring device will be used to collect a grab sample for VOCs and a composite core sample for all other analyses which is representative of the contents of the barrel. The coring device will be forced into the approximate center of the barrel to the full length of the corer. Upon removal from the barrel, the core will be removed using a stainless steel knife or spoon and will be placed in a stainless steel pan for compositing (except for the sample for VOCs which will be taken directly from the coring device prior to mixing).

5.5 Aquifer Tests

Single-well aquifer tests will be performed on all newly installed groundwater monitoring wells at JPG to measure the hydraulic conductivity of the upper aquifer. The slug-withdrawal method will be used. The slug withdrawal test apparatus will consist of a capped, weighted bailer and an electronic pressure transducer connected to an automatic electronic data logger. Both the transducer and the bailer are lowered into the well. The bailer support line and transducer cable will be marked to allow proper positioning within the well.

The transducer is lowered to a position 6 inches above the bottom of the well casing and the cable is taped to the exterior of the casing at the top of the well. The bailer is lowered until the top of the bailer is 6 inches below the fluid level. The data logger is turned on and

observed until the water level in the well stabilizes (data logger reading is constant). The recording interval is then set at "continuous" and the bailer is quickly lifted out of the fluid.

Continuous recording is maintained for the first 5 minutes of the test. At 5 minutes, the recording interval is set to 30 seconds; at 10 minutes, the recording interval is set to 1 minute; at 20 minutes, the recording interval is set to 2 minutes; and at 40 minutes, the recording interval is set to 5 minutes. The maximum recording interval of 10 minutes is set at 2 hours into the test and maintained until the water-level recovery rate becomes negligible.

The data from the slug tests will be entered into individual data files on a microcomputer. The first column of the data file will be "time in seconds" and the second column will be "hydraulic head in ft." From this information, as well as from well completion data (borehole radius, casing radius), the hydraulic conductivity will be calculated. Plots of the log of the normalized drawdown versus time will be plotted for each well.

5.6 Topographic Survey

A topographic survey will be conducted at JPG to accomplish the following objectives:

- Determine map coordinates and elevations of each new and existing monitoring well at JPG.
- Establish permanent survey control stations throughout JPG for use in establishing location information for all RI activities at JPG.
- Determine map coordinates for corner points of sample grids at specific sites at JPG as described in Section 4.0 of this plan.

All map coordinates established by the licensed surveyor will be within an accuracy of +/- 1 ft. Elevations established by the surveyor will be with +/- 0.01 ft. Completion of the well surveys will be completed as soon after well installation as possible in order that correct map data are available in the IRDMIS system to accompany laboratory analytical data.

5.7 Decontamination

To prevent cross-contamination, all downhole drilling equipments, monitoring well materials, and sampling equipment will be decontaminated prior to use and between use. Decontamination method requirements will vary according to the location and size of the equipment.

NOTE: USATHAMA requirements forbid the use of detergents or solvents unless special approval is received (i.e., materials contaminated with oil and grease may require a variance from these requirements).

5.7.1 *Drilling Equipment*

Drilling equipment will be steam-cleaned prior to arrival at JPG and again upon site arrival at a decontamination pad which will be constructed during equipment mobilization to the site. This pad will consist of a gently sloping pit which is lined with an impermeable liner for collection and containerization of decontamination wastes. The driller will supply sufficient material (i.e., auger flights, split-barrel samplers, and bits to drill more than one boring to eliminate unnecessary down time due to frequent trips to the decontamination pad. For remote sites, a temporary decontamination pad will be constructed at each site.

5.7.2 *Small Sampling Equipment*

For small sampling equipment such as scoops, trowels, spoons, hand augers, etc., decontamination may be completed using a decontamination station consisting of a plastic ground cover, cleaning pans, brushes, and sprayers. The equipment will first be brushed to remove the majority of visible materials (i.e., residual soil). The equipment will then be placed in a pan of USATHAMA-approved water where the equipment will be washed with scrub brushes. The equipment will then be moved to a second pan containing approved water for a clean rinse. The last stage will be the spraying of the equipment with distilled water followed by air drying and wrapping in plastic or foil wrap.

5.7.3 *Internally Contaminated Equipment*

During groundwater development, purging, and sampling, the internal portions of hoses and pumps may become contaminated. As with drilling equipment, the external parts may be cleaned using high pressure steam cleaning. The internal surface of the equipment will be cleaned by first circulating clean water through the system, followed by a second circulation of clean potable water, with a final circulation of distilled water. This will be accomplished by submerging the pump in the water sources and containerizing the circulated fluids at the other end of the system.

5.7.4 *Sample Containers*

Exterior surfaces of sample bottles will be cleaned prior to packing for transport to the laboratory by wiping the container with a clean paper towel at the sample site and then rinsing (as needed) with USATHAMA-approved or distilled water.

5.8 Waste Storage and Disposal

5.8.1 *Drill Cuttings*

Each boring location will be "diapered" with plastic ground cover and berms to prevent spillage of drilling wastes to the ground surface. The drill cuttings and sample waste will be transferred from the ground cover to 55-gallon drums which will be labelled with the borehole ID, material type, footage contained in each drum, and the date drummed. These

drums will be placed on pallets for pick-up by the installation or will be hauled to a specified staging or storage area.

Following receipt of laboratory analysis from samples collected from each boring, a determination will be made as to whether the materials in the drums are potentially hazardous. Drums suspected to contain hazardous materials will be sampled and the sample will be analyzed for the contaminant(s) of concern. If the boring sample data indicate that the cuttings are "clean" (containing no contaminants exceeding regulatory requirements for classification as hazardous waste), the waste materials will be returned to the site as fill materials. Wastes determined to be hazardous will be appropriately labelled and prepared for disposal by the installation.

5.8.2 *Monitoring Well Wastewater and Drilling Fluids*

Significant amounts of wastewater and drilling fluids are often generated through the process of monitoring well drilling, development, testing, and sampling. These wastes will either be placed in DOT-approved 55-gallon drums or will be collected in mobile storage tanks depending on the estimated volumes to be generated. For wells where groundwater samples were found to contain contaminants exceeding federal standards (i.e., drinking water standards), the containerized wastewater will be sampled and analyzed for the contaminant(s) of concern. For wells where no contaminants were detected in groundwater samples that exceeded regulatory standards, the water will be discharged to the sanitary sewer system where the water will pass through the installation's wastewater treatment facility. Water considered hazardous waste will be properly labelled and prepared for disposal by JPG.

5.8.3 *Contaminated Refuse*

Personnel protective equipment such as coveralls, gloves, and booties, as well as discarded paper towels and other refuse that contacts potentially contaminated materials will be placed in plastic bags which will be tagged with an identification tags that detail the date, location, materials disposed of, and suspected contaminants. These bags will in turn be placed in 55-gallon drums pending receipt of sampling data for the location (i.e., soil samples and groundwater samples). For those sites where no contaminants were found exceeding regulatory standards, the refuse will be taken to an on-site sanitary landfill. For those materials suspected to have been in contact with contaminants exceeding federal standards, the barrels containing those materials will be properly labelled and prepared for disposal by JPG.

6.0 FIELD MANAGEMENT

The following section describes the management activities required to ensure that the project is completed within the allotted time in a cost effective and safe manner, with safety being the highest priority. These activities involve communication, coordination, training,

scheduling, and management activities associated with all phases of the field investigation effort.

6.1 Logistics

6.1.1 *Communication and Coordination*

Coordination of the sampling activities at JPG will be the responsibility of the Project Manager and the Field Team Leader. Contacts will be made through the USATHAMA Project Officer and/or the JPG Environmental Office (EO) Manager to coordinate all field activities in a manner that has minimal impact on installation operations/activities.

The Project Manager or Field Team Leader will be responsible for contacting the appropriate JPG EO personnel prior to the start of work to arrange for proper access to all sites and to arrange for EOD support where necessary. Any installation permits required will also be obtained prior to the start of work. The Project Manager will also be responsible for obtaining any state or local permits as required. Badging of field personnel and any on-site training (i.e., safety training) will be conducted as part of the mobilization phase of the project. The project Manager will be responsible for arranging these support services through the installation EO.

Contractor personnel will not discuss or provide information to the public or the news media. Any communication outside of JPG will be directed to the USATHAMA Project Officer or appropriate JPG public relations personnel. Communications with outside government agencies will be coordinated through the USATHAMA Project Officer or the appropriate JPG personnel.

An office trailer will be set up at JPG to be used as a contractor command post with telephone and radio service available to handle routine coordination of the project, as well as emergency operations if necessary. Hook-up of this trailer to electrical service will be arranged through the installation or through an outside electrical contractor if installation support is not available.

Daily work assignments will be made by the Field Team Leader and these assignments and plans will be forwarded to the EO for review and concurrence prior to the start of work to minimize conflicts with installation operations.

6.1.2 *Equipment, Supplies, and Transportation*

All field equipment will be supplied by the contractor (and their subcontractors) conducting the work at JPG. Sampling equipment and supplies will be shipped to the installation or will be acquired locally and will be stored in the field trailer or in an equipment staging area located adjacent to the trailer. Vehicles used for the project will most likely be rental vehicles obtained from a local rental agency. Appliances required such as a refrigerator and freezer will be obtained locally through purchase or lease/rental.

Facilities or containers will be required for the storage and disposal of small quantities of potentially hazardous waste generated during the field sampling program. Arrangements will be made with JPG for the disposal of these wastes. Arrangements will be made for a decontamination pad area for the washing of equipment (i.e., contaminated drilling equipment). The contractor will provide the necessary materials and storage containers (i.e., 55-gallon drums) for decontamination pad construction and waste collection. If necessary, arrangements will be made to transport drummed or tanked waste to a staging or storage area specified by the installation.

6.1.3 *Field Personnel*

The number of field personnel will vary according to the field activity being performed. Typically, a field crew of 10 people may be on site at any one time. All field personnel will be fully trained and qualified in the task(s) for which they are assigned. Documentation of these qualifications and training will be maintained by the Project Manager and Field Task Leader. Field personnel will typically work on a 10-day-on and 4-day-off schedule, with the first and last days restricted to travel.

6.1.4 *Site Access and Control*

All personnel working at JPG will adhere to JPG site access, safety, and emergency requirements. Access to specific areas within JPG is restricted and personnel will not enter these areas unless prior approval has been obtained and the necessary JPG personnel have been notified of the location and schedule of the work to be performed. As necessary, JPG escorts will be used in restricted areas. All personnel will be required to wear badges for appropriate identification of contractor personnel by installation security.

Also, certain areas will require the ban of any flame producing devices or firearms. Other areas will have to have UXO clearance prior to entering the site. All such restrictions will be strictly adhered to by contractor and subcontractor personnel. Health and Safety restrictions are presented in the Health and Safety Plan (Volume IV).

6.1.5 *Sample Shipments*

Due to the short holding times associated with many of the samples collected for laboratory analysis, shipments will be made on a daily basis, using an overnight or priority-mail service. Shipments will be made from a local pick-up location according to the specific carrier's schedule.

6.2 Field Documentation

Documentation and records of all field activities at JPG will be maintained by the Field Team Leader and Project Manager at the field office while field operations are being conducted. The following is a description of the various types of documents which will be maintained and controlled during the field investigation phase of the RI.

6.2.1 *Document Control Log*

A log will be maintained in the field office which will document the issue and return of field logbooks. Personnel will sign and date the log at the time a specific logbook is issued to them. When the logbook is completed or the work is completed, the person will sign and date the return. If a logbook is to be transferred to another person, the check-in/check-out procedure will be followed.

6.2.2 *Field Logbooks*

Bound logbooks with consecutively numbered pages will be used by field personnel for each major field task performed. The logbook will be used to record daily activities of the field team, field measurements taken (or refer to field data forms used), provide sketch maps of measurement and sample locations, and to note any observations made (i.e., weather conditions, mechanical problems, or any other items which may affect the quality of the resulting data). Each page will be signed and dated by the person making the entries and will also be reviewed by an independent person who will review the entries for accuracy, completeness, and clarity. This second person will also sign and date the page following review.

6.2.3 *Daily Drilling Log*

This log will be completed daily by the drilling subcontractor who will document each day's drilling activities, including a record of boring numbers drilled, boring location, the footage drilled, materials used, standby time, problems encountered, and general observations. The log will also contain the name of all drilling personnel, their title, and their employer. These logs will be reviewed at the end of each day by a qualified contractor drilling supervisor and will be approved by the drilling supervisor as being complete and accurate. Upon completion of the project, these documents will become part of the project evidentiary file, which will be submitted to USATHAMA at project completion.

6.2.4 *Boring Log*

Each boring will have a boring log completed which documents such items as the boring ID and location, the contractor name, type of drilling being performed, the date, lithology encountered, ID number and depth of samples collected, blow counts (where applicable), measurements readings (i.e., PID measurements), and comments. These logs will be completed and submitted according to USATHAMA geotechnical requirements (Appendix B).

6.2.5 *Well Completion Log*

A well completion log will be completed for each new well installed at JPG. This will include a sketch of the well installation showing the types, depths, and quantities of materials used in the completion of the well (i.e., blank casing, screen, sand pack, and grout). The

sketch will be in sufficient detail to show such items as protective casing, well caps, locks, protective pad, and protective posts. These logs will be provided to USATHAMA according to the delivery schedule defined in the USATHAMA geotechnical requirements (Appendix B).

6.2.6 *Chain-of-Custody Forms*

A copy of each chain-of-custody form will be retained in a file maintained at the project site for traceability in the case of sample loss or delays in shipment. This file will be maintained in the field until completion of sampling activities and will become part of the permanent project file following completion of sample analysis activities. The original form will accompany the sample shipment and will be maintained by the laboratory performing the analysis.

6.2.7 *Project File*

The Project Manager will maintain a project file which will contain all pertinent information gathered in the course of fieldwork. This includes, but is not limited to, completed field data forms, completed logbooks, instrument calibration records, computer software, training records, permits (access, drilling, excavation), and accident reports.

6.3 Field Data Management

Data collected during the RI at JPG will initially be in various forms. Portions of the data will be handwritten in field logbooks, some will be in the form of instrument data output (i.e., strip charts), while other data will be transferred directly from instrumentation to a microcomputer data base. The field office trailer will contain a microcomputer and data-management system which will be used to enter and compile all of the data on a central database. For those files which will be entered into the USATHAMA IRDMIS system, a modem will be installed with linkage to the contractor's computer system that accesses the IRDMIS system. This will allow transfer of data from the field to be entered into the system (i.e., data to be entered into the map file or geotechnical file). Any programs used to correct or reduce field data will have undergone a QA verification prior to their use. A hard-copy output of the various completed data files will be placed in the permanent project files.

Hard-copy output will also be reviewed for accuracy and completeness following transfer of handwritten field data to the computer database to ensure that the data was entered correctly by the data entry person. This QA check will be performed on all data transferred manually. For data transferred automatically (i.e., from a field datalogger), the output will be spot checked for completeness and accuracy. An audit of all data will be completed prior to completion of field activities to allow the collection of additional data if previously collected data are found to be in error.

Copies of all data, including interpretative maps and plots, will be maintained in the on-site project file. In addition to data required by USATHAMA, computer modeling may be performed using QA-verified computer programs. This modeling may be used to guide

follow-on field activities (i.e., soil gas survey contaminant contour plots may assist the proper location of soil borings).

6.4 Field Schedule

The following proposed schedule for the completion of field activities at JPG is based on the timely review and approval of the RI/FS planning documents by USATHAMA and the appropriate regulatory agencies which includes a draft, final draft, and final version.

TASK	PROPOSED SCHEDULE
Mobilization	March 2 - 6, 1992
Field Investigations	
UXO Surveys	March 4 - 6, 1992
Soil Gas Sampling	March 7 - 9, 1992
Geophysical Surveys	March 6 - 20, 1992
Soil Borings and Sampling	March 16- April 22, 1992
Surface Water, Surface Soil, and Sediment Sampling	April 6 - 8, 1992
Monitoring Well Installation, Development, Testing, and Sampling (as required)	April 27 - May 20, 1992
Asbestos Survey/Sampling	March 30 - April 30,1992
Land Surveying (as required)	March 7 - May 8, 1992
Demobilization	May 18-20, 1992

7.0 ANALYTICAL LABORATORY METHODS

The QA/QC objectives of accuracy, precision, completeness, comparability and representativeness are well defined in the USATHAMA Quality Assurance Program Plan (USATHAMA, 1990). The following section briefly describes the laboratory program for ensuring the objectives are met. More detail is provided in the site-specific Quality Control Plan (Volume III).

7.1 Laboratory Procedures

All laboratory procedures will be checked for accuracy through internal laboratory quality-control checks, such as the running of blind duplicates, splits, and known standards. These checks are described in more detail in the Quality Control Plan (Volume III). Only USATHAMA-certified methods will be used and verification of the laboratories current certification will be made prior to start of the project. Table 2 presents the analytical parameters and USATHAMA methods that will be used for the RI at JPG. Where appropriate, the corresponding EPA methods are referenced for comparison. The subcontract laboratory performing analytical support for the RI at JPG will provide a list of equipment and personnel to be used as well as the certification information required. These

Table 2. Analytical Parameters for JPG

ANALYTICAL PARAMETER	USATHAMA METHOD/TYPE
Semi-Volatile Organic Compounds	LM-15 (soil)/ GCMS (EPA Methods 8270, 625) UM-16 (water)/ GCMS
1,2,3-Trichlorobenzene	
1,2,4-Trichlorobenzene	
1,2-Dichlorobenzene	
1,3-Dichlorobenzene-D4	
1,3-Dichlorobenzene	
1,4-Dichlorobenzene	
2,4-Dinitrobenzene	
2-Chloronapthalene	
alpha-Benzenehexachloride	
alpha-Hexachlorocyclohexane	
Aldrin	
Acenaphthene	
Acenaphthylene	
Anthracene	
Bis(2-chloroethyl)ether	
Bis(2-ethylhexyl)phthalate	
Benzo[A]anthracene	
Benzo[A]pyrene	
Benzo[B]fluorene	
beta-Benzenehexachloride/beta-hexachlorocyclohexane	
Benzo[G,H,I]fluoranthene	
Benzo[K]fluoranthene	
Chrysene	
Hexachlorobenzene	
Hexachloroethane	
p-chlorophenylmethyl sulfide	
p-chlorophenylmethyl sulfoxide	
p-chlorophenylmethyl sulfone	
Dibenz[A,B]anthracene	
delta-Benzenehexachloride/delta-Hexachlorochyclohexane	
Diethyl phthalate-D4	
Dithiane	
Dieldrin	
Di-N-octyl phthalate	
Di-N-octyl phthalate-D4	
Endrin	
Fluoranthene	
Hexachlorobutadiene	
Heptachlor	
Heptachlor epoxide	
Indeno[1,2,3-C,D]pyrene	
Lindane	
Malathion	
Napthalene	
Nitrobenzene-D5	
Nitosodi-N-propylanime	
1,4-Oxathiane	
Phenanthrene	

Table 2. Analytical Parameters for JPG (continued)

ANALYTICAL PARAMETER	USATHAMA METHOD/TYPE
Semi-Volatile Organic Compounds (continued)	
2,2-Bis(p-chlorophenyl)-1,1-dichloroethane	
2,2-Bis(p-chlorophenyl)-1,1-dichloroethane	
2,2-Bis(p-chlorophenyl)-1,1,1-trichloroethane	
Parathion	
Pyrene	
Volatile Organic Compounds	LM-16 (soil)/ GCMS UM-17 (water)/ GCMS
1,1,1-Trichloroethane	
1,1,2-Trichloroethane	
1,1-Dichloroethylene/1,1-Dichloroethene	
1,1-Dichloroethane	
1,2-Dichloroethane-D4	
1,2-Dichloroethene/1,2-Dichloroethylene	
1,2-Dichlorobenzene	
1,2-Dichloroethane	
1,2-Dichloropropane	
1,3-Dichlorobenzene	
1,3-Dichloropropane	
1,4-Dichlorobenzene	
(2-Chloroethoxy) ethene/ 2-Chloroethylvinyl ether	
Bromochloromethane	
Chloroethene/ Vinyl Chloride	
Chloroethane	
Benzene	
Carbon tetrachloride	
Methylene Chloride-D2	
Methylene Chloride	
Chloromethane	
Bromoform	
Chloroform	
Chlorobenzene	
Dibromochloromethane	
Ethylbenzene-D10	
Ethylbenzene	
Toluene-D8	
Toluene	
1,2,2,2-Tetrachloroethene	
Tetrachloroethylene/ Tetrachloroethene	
Trichloroethylene/ Trichloroethene	
TCLP Metals	JS-15 (soil)/ ICP SIM SS-16 (water)/ ICP SIM
Arsenic	
Barium	
Cadmium	
Chromium	
Selenium	

Table 2. Analytical Parameters for JPG

ANALYTICAL PARAMETER	USATHAMA METHOD/TYPE
TCLP Metals	
Lead	SD-24 (soil)/GFAA (EPA Methods 206-2, 270-2, 272-2) SD-16 (water)/GFAA
Mercury	JB-03 (soil)/CVAA (EPA Method 245-2) SB-03 (water)/CVAA
Silver	JC-06 (soil)/AA SD-24 (water)/AA
Explosives	LW-26 (soil)/HPLC UW-20 (water)/HPLC
1,3,5-Trinitrobenzene	
1,3-Dinitrobenzene	
2,4,6-Trinitrotoluene/ alpha-Trinitroluene	
2,4-Dinitrotoluene	
2,6-Dinitrotoluene	
2-Nitrotoluene	
Cyclotetramethylenetetranitramine	
Nitrobenzene	
Cyclonite/ Hexahydro-1,3,5-trinitro-1,3,4-triazine	
Nitramine/ N-Methyl-N,2,4,6-tetranitroanilien/ Tetryl	
Cyanide	KY-02 (soil)/ SPEC (EPA Method 335-5) TY-12 (water)/ Manual
Anions	
BR	TT-08 (water) Chromatography
CL	
F	
NIT	
N02	
N03	
P04	
S04	
Herbicides	LW-29 (soil)/ HPLC UW-31 (water)/ HPLC
2,4,5-Trichlorophenoxyacetic acid	
2-(2,4,5-Trichlorophenoxy) Propionic acid	
2,4-Dichlorophenoxyacedic acid	
Total Petroleum Hydrocarbons	EPA Method 418.1
BTEX	LM-16 (soil)/ GCMS (EPA Methods 8240, 624)
Polychlorinated biphenols (PCBs) and Dibenzo-p-dioxins	EPA Method 625/GCMS

lists will be reviewed and approved by the contractor and USATHAMA (as required) prior to the start of work.

7.2 Quality Assurance/Quality Control

The Quality Control Plan (Volume III) describes in detail the laboratory QA/QC requirements for the analysis of samples collected under the RI/FS for JPG. The following provides a description of the general laboratory requirements.

7.2.1 *Laboratory Certification*

The laboratory conducting the analysis of samples collected at JPG must use only methods that are approved and certified under the USATHAMA Quality Assurance Program (QAP) plan and must present evidence of current USATHAMA certification. Under this certification process, the laboratory's certified reporting limit is determined. Also determined is the range of concentrations for which the method is certified. Materials that exceed the range must be diluted.

7.2.2 *Sample Log-in and Inspection*

The subcontract laboratory's sample custodian will be responsible for the receipt and log-in of all samples from the field. The sample custodian will break the security seal on the cooler and check each shipment to verify that the sample security seals are in place and that the samples were received in good condition in the appropriate containers.

Samples will be logged in a bound master sample log notebook and the condition of the samples will be recorded on the field chain-of-custody form. Immediately following physical log-in of the samples, the sample information will be entered into a database and a lot number will be assigned for each analysis.

The logged-in samples will be stored in a climate-controlled storage area (i.e., refrigerator/freezer specifically designed for sample storage and sample security (locked room and/or locked refrigerator with limited access).

7.2.3 *Quality Control Samples*

Field QC Samples. Field QC samples to be collected and sent to the analytical laboratory include duplicates, VOC trip blanks, rinse blanks, and filtration blanks. Trip blanks will consist of organic-free water contained in amber glass VOC bottles shipped from the laboratory that will accompany each cooler containing samples for VOC analysis during shipment from the field to the laboratory (to determine if VOC contamination occurred during shipment). Rinse blanks will consist of water (from a USATHAMA-approved source) collected from sampling equipment following decontamination procedures to determine the effectiveness of cleaning. These samples will be analyzed for the same analytes as the samples collected for analysis at JPG. Filtration blanks will be collected for water samples requiring inorganic analysis. This will consist of a USATHAMA-approved water source being passed through the same filter system as the other samples.

Laboratory QC Samples. Spiked matrix samples are to be analyzed by the subcontract laboratory as required by the USATHAMA QAP. These typically consist of 4 QC samples (1 method blank, 1 low spike, and 2 high spikes) per sample lot. Sample lot sizes have been determined in existing certified methods. Efforts will be made by the subcontract laboratory to manage the sample flow to optimize lot size. Whenever possible, samples from the same installation will be analyzed within the same lot.

7.2.4 *Instrument Calibration*

Chemical calibrations of instruments will be performed for each target analyte using calibration standards prepared from SARMs, IRMs, or off-the-shelf materials. These calibrations will be performed daily to ensure the instrument is functioning properly. Standard materials are obtained from USATHAMA, the EPA, and/or purchased from chemical suppliers. They are used as surrogate compounds, internal standards, and target analytes standards during precertification, certification, chemical calibrations, and sample analysis (i.e., spiked samples). All standards will be kept in a locked storage area by the subcontract laboratory.

7.2.5 *Logs*

Documentation of all activities are to be kept in a bound laboratory notebook, on lab/field logs, and on QA/QC forms. Activities requiring logs will include, but not be limited to, sample log-in, chain-of-custody, instrument calibration, sample preparation, sample analysis spreadsheets, standard solution preparation, and corrective action (when required).

7.2.6 *Control Charts*

Under the USATHAMA laboratory certification program, the laboratory performing the sample analysis is required to produce control charts. These charts include Single Day XBAR and Range Control charts for high spikes, and Three-day Moving XBAR and Range Control charts for low spikes and GC/MS analyses. These control charts are reviewed for out-of-control situations and trends, which are remedied through a corrective action system. Typically, out-of-control samples will be reanalyzed unless holding times are exceeded.

7.2.7 *Audits, Surveillance, and Data Review*

A QA audit will be performed by the contractor and/or USATHAMA during the analytical analysis phase of the RI at JPG utilizing the QA audit checklist presented in the USATHAMA QAP. Laboratory QA personnel will also be responsible for reviewing raw sample data and QC data prior to entry into the IRDMIS system. They will also be responsible for collecting and assembling a final data package for shipment to the contractor and USATHAMA.

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